

# A Comparative Study of Levobupivacaine with Fentanyl and Levobupivacaine with Dexmedetomidine in Thoracic Epidural Block for Laparoscopic Cholecystectomy

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## ABSTRACT

**Introduction:** Laparoscopic cholecystectomy has traditionally been performed under general anesthesia, epidural anesthesia has emerged as a more suitable alternative for the minimally invasive laparoscopic cholecystectomy with minimal complications. We conducted a clinical study comparing levobupivacaine with fentanyl and a combination of levobupivacaine with dexmedetomidine in thoracic epidural anesthesia for laparoscopic cholecystectomy as sole anaesthetic.

**Material and Methods:** After taking approval from Institutional Ethical Committee, 60 adult patients of ASA grade I and II were divided into two groups; group A where levobupivacaine 0.5% (2mg/kg) with 1.5µg/kg fentanyl was given and in group B levobupivacaine 0.5% (2mg/kg) with 0.5 µg/kg of dexmedetomidine. Thoracic epidural was given at the T<sub>10</sub>-T<sub>11</sub> interspace to obtain a sensory block of T<sub>4</sub>-L<sub>2</sub> dermatome which was judged every minute by pin prick method till complete sensory block was established. Hemodynamic

**Result:** Onset of action was fast and duration of action was longer in group A patients. Also fall in blood pressure and heart rate was greater in group B patients. Less incidence of shoulder pain was found in group A patients. Oxygen saturation (Sp<sub>o2</sub>) was comparable in both the groups and no respiratory distress was seen. More post-operative analgesia was required in group B. Also no complications were seen postoperatively in both the groups.

**Conclusion:** Levobupivacaine with fentanyl provides better anesthesia and haemodynamic stability than levobupivacaine with dexmedetomidine in thoracic epidural for laparoscopic cholecystectomy.

**Keywords:** Dexmedetomidine, Fentanyl, Thoracic epidural anesthesia, Laparoscopic cholecystectomy.

block achieved by a spinal anesthetic is below desired level required to perform laparoscopic surgery in many cases, it is because the drug accumulates in the sacral region due to lumbar lordosis. Also, volume of cerebrospinal fluid varies from patient to patient making the level of block unpredictable, with a block level above T4 desirable for laparoscopic cholecystectomy, but may cause significant cardiac depression.<sup>3</sup>

Contrary to this, in epidural anesthesia, the titration of block level is easier, and therefore it is preferable even in patients with medical conditions such as cardiac disease and obstructive airway disease which depend on active expiration for maintaining lung ventilation, where a slower onset of sympathetic block and minimized muscle weakness are desirable.<sup>4</sup>

During epidural patient is required to be relaxed and cooperative, Low intra-abdominal pressure (IAP) is required to reduce shoulder pain and ventilation disturbances. Patient is on spontaneous ventilation and is able to adjust his breathing and respiration during surgery.

Levobupivacaine is the isolated S (-) isomer of bupivacaine and is less cardiotoxic. Addition of Fentanyl or dexmedetomidine decreases the dose requirement of levobupivacaine, so eliminating the side effects of larger doses of levobupivacaine and improves the quality of block. Fentanyl is an opioid which acts on µ-1 opioid receptors (widely distributed in CNS and other tissues) producing supraspinal analgesia, The µ-receptors exist mostly presynaptically in the periaqueductal gray region, and in the superficial dorsal horn of the spinal cord (specifically the substantia gelatinosa of Rolando).

While dexmedetomidine is an alpha 2 agonist that produces analgesia via a non-opioid mechanism providing better

## INTRODUCTION

Laparoscopic cholecystectomy has traditionally been performed under general anesthesia, epidural anesthesia has emerged as a more suitable alternative for the minimally invasive laparoscopic cholecystectomy with minimal complications. We conducted a clinical study comparing levobupivacaine with fentanyl and a combination of levobupivacaine with dexmedetomidine in thoracic epidural anesthesia as sole anaesthetic for laparoscopic cholecystectomy.<sup>1,2</sup>

Regional anesthetic approaches such as segmental low thoracic epidural anesthesia in laparoscopic cholecystectomy has many advantages over lumbar spinal anesthesia and helps in avoiding urinary retention with early ambulation and possibility of day care surgery setting. Also the level of

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analgesia and helps in sparing of doses and side effects of levobupivacaine. The  $\alpha_2$ -adrenergic receptor is classically located on vascular prejunctional terminals where dexmedetomidine inhibits the release of norepinephrine (noradrenaline) in the form of negative feedback. Dexmedetomidine is a highly selective  $\alpha_2$  Adrenergic agonist with an affinity of eight times greater than clonidine. The aim of the proposed study was to establish the role of fentanyl and dexmedetomidine as an adjuvant to epidural levobupivacaine and to study their beneficial clinical effects. Objectives of the research were to compare and determine the onset of sensory analgesia and duration of post-operative analgesia in patients undergoing laparoscopic cholecystectomy under thoracic epidural anesthesia with 0.5% (2mg/kg) levobupivacaine with 1.5 $\mu$ g/kg fentanyl and 0.5% (2mg/kg) levobupivacaine with 0.5 $\mu$ g/kg dexmedetomidine, to study the hemodynamic responses of the drug during surgery, to detect any complication or side effects as a result of these drug and to study the need of intra-operative and post-operative analgesic drug (rescue analgesia) within 24hr after block and to judge muscle relaxation during surgery.

## MATERIAL AND METHODS

After obtaining approval of ethical committee and written informed consent, 60 ASA physical status I and status II patients aged 18–60 years, of both sexes, scheduled for laparoscopic cholecystectomy under epidural anesthesia were included in this study. Exclusion criteria were presence of chronic obstructive pulmonary disease, severe anemia, heart disease, morbid obesity, deranged liver function test, patient on anticoagulant therapy, renal diseases and endocrine diseases.

Preanesthetic check up was done a day before surgery, relevant investigations were done and informed written consent was taken. Patient were asked to remain nil per oral 8 hrs before surgery. Patient were premedicated with tablet alprazolam 0.5 mg and tab ranitidine 150mg in the night before surgery.

In OT a good IV access was secured and preloading done with 500ml lactated ringer's solution and a monitor was attached for monitoring ECG, HR, NIBP, SPO<sub>2</sub>, temperature, respiratory rate. Doses of the were given drug according to the body weight. Patient were made to sit with their elbows resting on their thighs on a bedside table. Flexion of the spine was done and midline approach was used for epidural.

After proper positioning and under strict aseptic precautions local infiltration with 2ml of 2% lignocaine with adrenaline

1:200, 000 was done at T10-T11 intervertebral space. Epidural block was given with 18 G gauge Tuohy's needle (by the loss of resistance method with 10ml L.O.R Syringe). A test dose of 3ml of 2% lignocaine hydrochloride solution containing 1:200, 000 adrenaline was injected and there after patients in group I received 2mg/kg 0.5% L-bupivacaine and 1.5  $\mu$ g/kg of fentanyl and patients in group II received 2mg/kg 0.5% L-bupivacaine and 0.5  $\mu$ g/kg of dexmedetomidine. The drugs were prepared by an anesthetist who was not aware of the procedure. Onset of action and level of sensory block was judged by pin prick method. The two groups were monitored intraoperatively for heart rate, non-invasive blood pressure and arterial O<sub>2</sub> saturation (SpO<sub>2</sub>). Hypotension was defined as systolic blood pressure <90 mmHg or >20% decrease in baseline values and was treated by fluids and vasopressors (mephentermine 6mg). Bradycardia was defined as heart rate <50/min and was treated by 0.6 mg of atropine injection. Intraoperative nausea, vomiting, pruritus, sedation or any other side effects were recorded.

## STATISTICAL ANALYSIS

At the end of the study the data was compiled systematically and analyzed using statistical package for social sciences (SPSS) software. Chi-square test was used to compare the proportional data. Mean differences were compared using students *T*-test and a *P* value < 0.05 showed a significant intergroup difference.

## RESULTS

There was no statistically significant difference between the two groups in any of the demographic data. At baseline, mean heart rate, diastolic blood pressure, systolic blood pressures were comparable between the two group and were in normal ranges.

Mean heart rates of two groups were comparable throughout the procedure and did not show a statistically significant difference ( $p > 0.05$ ). Mean diastolic blood pressures of two groups were comparable throughout the procedure and did not show a statistically significant difference at all time intervals ( $p > 0.05$ ). Mean systolic blood pressures of two groups were comparable throughout the study ( $p > 0.05$ ). In both the groups at all follow up intervals mean heart rate, systolic blood pressures and diastolic blood pressures were significantly lower as compared to baseline ( $p < 0.05$ ).

Mean onset time of sensory block was 4.02 $\pm$ 1.14 minutes in Group I and 8.45 $\pm$ 2.56 minutes in Group II, thus showing a statistically faster onset of block in Group I ( $p < 0.05$ ). Mean

Hemodynamic Variables	Group I (n=30)		Group II (n=30)		Statistical significance	
	Mean	SD	Mean	SD	't'	'p'
Heart Rate (per min)	92.6	14.48	90.6	14.24	0.44	0.6621
Diastolic BP (mm Hg)	78.2	10.12	76.6	11.69	0.463	0.6462
Systolic BP (mm Hg)	126.2	17.12	126.55	18.72	0.062	0.9511
It was found that all the above hemodynamic variables (heart rate, diastolic BP and Systolic BP) of Group I and II were statistically comparable.						
<b>Table-1:</b> Inter Group Comparison of Baseline Hemodynamic Variables						

Time Interval	Group I		Group II		Statistical Significance	
	Mean	SD	Mean	SD	't'	'p'
Baseline	92.6	14.48	90.6	14.24	0.44	0.6621
5 min	90.5	15.97	88.2	13.12	1.502	0.137
10 min	85.9	15.35	83.7	14.27	0.082	0.9351
15 min	82.4	17.64	78.45	20.54	1.137	0.259
20 min	83.5	16.19	80.85	18.29	0.222	0.8246
25 min	79.7	15.69	76.65	17.61	0.905	0.368
30 min	80.6	16.22	77.8	17.77	0.911	0.365
35 min	78.3	16.89	75.65	16.95	1.2	0.2344
40 min	74.3	13.54	72.1	12.74	1.622	0.1095
45 min	76.7	10.65	73.23	11.17	1.927	0.0852
50 min	78.6	11.24	76.85	10.17	1.1623	0.1127
55 min	83	14.05	80.75	15.9	1.161	0.2536
60 min	76.2	7.1	74.5	4.94	1.913	0.0653

Heart rates were comparable in both the groups at any of the above time intervals.

**Table 2: Inter Group Comparison of Heart Rate (per minute) at different time intervals**

Time Interval	Group I		Group II		Statistical Significance	
	Mean	SD	Mean	SD	't'	'p'
Baseline	126.2	17.12	126.55	18.72	0.062	0.9511
5 min	115.8	19.97	114.75	20.91	1.302	0.127
10 min	106.9	18.52	108.45	18.06	0.078	0.9421
15 min	114.7	23.33	115.7	16.12	1.184	0.2123
20 min	114.7	18.19	121.3	26.86	0.346	0.8642
25 min	115.4	17.26	115.05	16	0.905	0.368
30 min	111.6	17.58	117.25	13.73	0.911	0.365
35 min	112.4	15.01	110.15	12.7	1.1623	0.1127
40 min	110.1	17.01	108.78	12.21	1.161	0.2536
45 min	113.8	14.48	110.46	10.11	1.67	0.1008
50 min	107.9	10.6	110	6.68	0.389	0.7174
55 min	107.9	4.6	106	4.32	0.819	0.4186
60 min	113.2	1.84	102	1.41	0.303	0.764

Systolic blood pressures were comparable in both the groups at any of the above time intervals.

**Table-3: Inter Group Comparison of Systolic Blood Pressure (mm Hg) at different time intervals**

Time Interval	Group I		Group II		Statistical Significance	
	Mean	SD	Mean	SD	't'	'p'
Base-line	78.2	10.12	76.6	11.69	0.463	0.6462
5 min	72	11.86	71.05	13.95	1.532	0.127
10 min	65	13.96	65.75	11.8	0.092	0.9151
15 min	71.2	14.01	72.2	15.75	1.147	0.2492
20 min	73.9	12.73	75.6	16.78	0.252	0.8231
25 min	73	12.84	71.6	13.61	0.806	0.388
30 min	71.5	13.98	74.35	10.08	0.962	0.3858
35 min	72.1	11.45	70.5	11.32	1.1623	0.1127
40 min	69.1	12.31	68.15	8.82	1.181	0.2432
45 min	72.6	10.97	70.46	6.23	1.913	0.0653
50 min	69.6	10.78	70.01	5.99	0.389	0.7174
55 min	68.1	8.24	66.75	3.77	1.924	0.0945
60 min	64.9	8.25	62.5	9.19	1.813	0.0753

Diastolic blood pressures were comparable in both the groups at any of the above time intervals.

**Table-4: Inter Group Comparison of Diastolic Blood Pressure (mm Hg) at different time intervals**

duration of sensory block was  $6.5 \pm 0.78$  hours in Group I and  $5.74 \pm 1.53$  hours in Group II, thus showing a longer duration of block in group II ( $p < 0.05$ ).

Vasopressor requirement was significantly higher in Group II (62.5%) as compared to Group I (40%) ( $p < 0.05$ ). Ketamine requirement for shoulder pain was significantly higher in Group II (35%) patients as compared to Group I (20%) ( $p < 0.05$ ). Also atropine requirement was significantly higher in Group II (5%) as compared to nil in Group I ( $p < 0.05$ ).

Muscle relaxation was judged as fair by the surgeon in most of the cases at the end of surgery. None of the patient complained of vomiting, headache and pruritis postoperatively. Also, Group I had significantly lower rescue analgesic need as compared to Group II ( $p < 0.05$ ).

## DISCUSSION

Laparoscopic cholecystectomy (LC) has traditionally been performed under general anesthesia, epidural anesthesia has lower postoperative mortality and fewer complications than general anesthesia, so epidural anesthesia seems more suit-

able for the minimally invasive laparoscopic cholecystectomy.<sup>1</sup>

Zahoor MU, Masroor R and Khurshid *Tet al.* compared the postoperative pain relief and vomiting and the length of hospital stay in patients undergoing open cholecystectomy under general anesthesia versus those receiving thoracic epidural anesthesia and concluded that the use of intra-operative epidural anesthesia combined with postoperative epidural analgesia was found to be associated with reduction in the postoperative pain and vomiting in patients undergoing open cholecystectomy.<sup>2</sup>

Epidural anesthesia is found to be safe for laparoscopic cholecystectomy as the respiratory control mechanism remains intact and the patients is able to adjust their minute ventilation. So, the respiratory changes are pronounced in awake patients under regional anesthesia and patient is able to maintain an unchanged end tidal carbon dioxide levels.<sup>3</sup> Neuraxial blockade has been employed routinely in patients with s co-morbid conditions when intra-abdominal pressure is kept low and the patient tilt is to a lesser degree during surgical procedure.<sup>4</sup> Shoulder pain occurs due to diaphragmatic irritation from carbon dioxide used to create pneumoperitoneum and is incompletely alleviated with epidural anesthesia alone. Extensive sensory block from T4 to L2 is needed for the laparoscopic procedure.<sup>4,5</sup>

Usually, Bupivacaine is used to produce epidural thoracic block for laparoscopic cholecystectomy procedures.<sup>5</sup> Levobupivacaine is relatively safer and has been reported to have equivalent efficacy. Use of  $\alpha_2$  agonists like clonidine, dexmedetomidine and opioids like fentanyl as adjuvant increases the analgesic efficacy of spinal and epidural anesthesia, it increases the pharmacokinetics of the main anesthetic agents used and helps in early achievement and maintenance of block over a reasonable period of time.<sup>5-9</sup>

With this background two anesthetic adjuvant drugs *i.e.* dexmedetomidine and fentanyl, were evaluated for their performance in epidural thoracic block with levobupivacaine for conducting laparoscopic cholecystectomy.

For this purpose a double-blinded prospective randomized controlled study was carried out in which a total of 60 patients belonging to ASA grade 1 or 2 undergoing laparoscopic cholecystectomy procedure were enrolled and were randomly allocated to one of the two groups. A total of 30 patients in Group I received epidural anesthesia with 0.5% (2 mg/kg) levobupivacaine with 1.5  $\mu$ g/kg fentanyl while remaining 30 patients in Group II received epidural anesthesia with 0.5% (2 mg/kg) levobupivacaine with 0.5  $\mu$ g/kg dexmedetomidine.

At baseline both the groups were comparable hemodynamically. Throughout the procedure, statistically no significant difference between two groups was observed with respect to hemodynamic parameters. In both the groups, throughout the procedure, mean heart rate and blood pressure levels were either significantly lower or comparable to the baseline levels.<sup>6-10</sup>

In both the groups most of the times hypotensive effect of anesthetic agents was observed. Both the combinations

showed an average decline of 20-30% in the hemodynamic parameters as compared to baseline readings.

Sedation and muscle relaxation were adequate in both the groups. Bajwa et al showed in their study that dexmedetomidine was a better adjuvant than clonidine in epidural anesthesia for patient comfort, superior sedative and anxiolytic properties, intra-operative and postoperative analgesia.<sup>9</sup> Mean onset time of sensory block was  $4.02 \pm 1.14$  minutes and mean duration of sensory block was  $6.5 \pm 0.78$  hours in Group I although Gupta A, Gupta K and Gupta PK et al in their study with ropivacaine and fentanyl for thoracic epidural anesthesia for laparoscopic cholecystectomy found mean onset time of sensory block to be 15 minutes; this may be because 0.75% ropivacaine was used instead of 0.5% levobupivacaine and as we know that ropivacaine is less potent than levobupivacaine and a fixed dose of 50  $\mu$ g fentanyl was used.<sup>6,11</sup>

Mean onset time of sensory block was  $8.45 \pm 2.56$  minutes and mean duration of sensory block was  $5.74 \pm 1.53$  hours in Group II, Kamal et al in their study used levobupivacaine with dexmedetomidine for thoracic epidural anesthesia for major abdominal surgeries found that mean onset of sensory block as  $12.6 \pm 5.9$  minutes and mean regression time of sensory block was  $390 \pm 87.6$  mins, which did not match our results, the reason may be the dose dependent effect of the drugs.<sup>7</sup>

In present study, Group I had significantly lower rescue analgesic need as compared to Group II, thus showing that levobupivacaine in combination with fentanyl provided a better analgesic effect as compared to levobupivacaine in combination with dexmedetomidine.

Erol DD, Yilmaz S and Polat *Cet al.* compared the use of intravenous and thoracic epidural analgesia in patients undergoing general anesthesia with sevoflurane for laparoscopic cholecystectomy in the early postoperative period and concluded that thoracic epidural anesthesia using fentanyl reduced postoperative pain in patients.<sup>12</sup>

Use of thoracic epidural anesthesia for laparoscopic cholecystectomy is a safer and satisfactory alternative technique in many cases. Addition of dexmedetomidine to levobupivacaine improves the quality of block and prevents hemodynamic perturbations caused by pneumoperitoneum and reduce the incidence of shoulder pain.<sup>5,9</sup> Ketamine was used for alleviating shoulder pain in 8 patients in group I and 12 patients in group II at a fixed dose of 25mg. Incidence of shoulder pain is proportional to the magnitude of intra-abdominal pressure.<sup>4-6,9,11</sup>

The thoracic epidural anesthesia with 0.75% ropivacaine and fentanyl for elective laparoscopic cholecystectomy is efficacious and has preserved ventilation and hemodynamic changes within physiological limits during pneumoperitoneum with minimal treatable side effects.<sup>6</sup>

Although levobupivacaine is free from any cardiotoxic effects and has a similar safety profile, but hypotensive effect in both the groups was due to blockade of sympathetic system. Maintenance of blood pressure lower than the baseline is a preventive measure in laparoscopic cholecystectomy cases in order to tackle with the surgical stress response.

However, hypotensive episodes were of considerable significance in both the groups.

## CONCLUSION

Thoracic epidural anesthesia for laparoscopic cholecystectomy is a satisfactory alternative technique in selected cases. Addition of anesthetic adjuvant drugs like fentanyl or dexmedetomidine to levobupivacaine not only produces better qualitative anesthetic conditions but also prolongs the duration of analgesia. Both these drugs not only prevent hemodynamic perturbations produced by pneumoperitoneum but also decreases the incidence of shoulder pain.

In our study we found fentanyl along with levobupivacaine to produce shorter onset and longer duration of analgesia than with levobupivacaine with dexmedetomidine. Also the need for vasopressors, atropine and post-operative analgesia were significantly less with fentanyl group. Not only this hemodynamic perturbations produced by pneumoperitoneum and the incidence of shoulder pain were also significantly less with levobupivacaine and fentanyl group.

Also, further studies with smaller doses of adjuvant dexmedetomidine are recommended for ensuring better clinical safety and reduced vasopressor and atropine use.

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# Color Doppler Study of Carotid Arteries in Transient Ischemic Attack and Stroke

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## ABSTRACT

**Introduction:** Stroke causing ischemia from flow limiting stenosis (20-30%) or thromboembolic events (70%) due to atherosclerotic disease at the carotid bifurcation is one of the leading causes of morbidity and mortality over the world. Color Doppler Ultrasound (CDU) has become a useful addition to the sonographic evaluation of stenotic areas in which abnormal velocities easily identified and sampled using CDU. Another important usefulness of CDU is its ability to detect narrowing produced by anechoic plaques, which missed by B mode US.

**Material and methods:** This prospective study was conducted on 50 patients, who were referred to the Radio diagnosis, Department of N.S.C.B. Medical College & Jabalpur over a period of one year (2012-2013). The scan was performed on a SIEMENS-SONOLINE G-50, B Loqic 3 Expert-Ay 15CUK-GE. High frequency linear transducer with a range 12 MHz's

**Results:** 32% presented with TIA and 68% with stroke. Age range of these cases was 18 to 80 years with overall mean range of 53(+6.8) years. The most common risk factor was hypertension in 48% cases followed by smoking in 24%. TIA showing the presence of plaque is 34.3%, Similarly, in cases with stroke, we observed plaque in 45.5% and the overall prevalence of plaque in symptomatic cases was found to be 42%. The type I, II and III plaque are predominantly observed with significant stenosis (i.e. stenosis >50%). We observed 56% of smooth plaques, 2.5% ulcerated plaque while irregular plaque were seen in 41% cases. Smooth plaque were seen in 62% TIA and 54.8% stroke patients and irregular plaques were seen in 37% TIA and 41.9% stroke patients. A homogenous plaque category 77.7% plaques observed with <50% stenosis, 22.2% with 50-69% stenosis and no case for higher occlusion were found. While 34.9% cases were found with more than 50% stenosis and their corresponding PSV seen was 125 cm/sec or more. There was a significant positive linear relationship of higher percentage stenosis for the non-lacunar infarct CT findings ( $p < 0.05$ ).

**Conclusion:** Color Doppler sonography is considered the first step in the diagnostic work up of carotid atherosclerosis and evaluation of plaque. CDU is not only noninvasive, widely available, accurately quantifies stenosis, but more importantly helps in characterization of plaques. We conclude by saying that there is definitely revolutionize the diagnosis, evaluation and management of cerebrovascular disease.

**Keywords:** Color Doppler, Stroke, Transient ischemic attack, Stenosis.

rotic disease at the carotid bifurcation is one of the leading causes of morbidity and mortality over the world. A significant number of these ischemic can be prevented because of an extraordinary expansion in the approach to the diagnosis and the management of patients with carotid stenosis.

The blood that passes through the two internal carotid arteries nourishes about 75% of the brain substance. For anatomic and hemodynamic reasons alone, many strokes are in the carotid territory. Finally, the most common cause of arterial stenosis is atherosclerosis, which is most prevalent in the carotid vasculature at the carotid bifurcation.

Conventional angiography continues to be the gold standard for the evaluation of stenosis. However, it has certain limitations such as invasive procedure, associated morbidity, High degree of training, and inaccurate measurement for carotid stenosis.

Therefore, clinicians and patients are reluctant for such an invasive procedure and would prefer a noninvasive procedure, which is diagnostic, has acceptable specificity, sensitivity and cost effective.

Carotid ultrasound is inexpensive, non invasive, and widely available and can provide a reliable assessment of extra cranial carotid arteries. Apart from being able to assess the degree of stenosis US is probably the best modality available to visualize small atherosclerotic plaques and is also able to define the extent, location and characterization of the plaque. Heterogeneous and irregular surface plaques usually associate with a higher risk of stroke.<sup>1</sup> The detection of plaques ulceration using US is controversial.<sup>2</sup>

US can help in assessing velocity of blood through the carotid vessels. In the presence of narrowing of the vessel lumen, velocity of blood flow increases. A number of studies,<sup>3</sup> have shown that the increase in velocity to assess the degree of luminal narrowing.

Color Doppler Ultrasound (CDU) has become a useful addition to the sonographic evaluation of stenotic areas in which abnormal velocities easily identified and sampled using CDU. Another important usefulness of CDU is its ability to detect narrowing produced by anechoic plaques, which

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## INTRODUCTION

Stroke causing ischemia from flow limiting stenosis (20-30%) or thromboembolic events (70%) due to atheroscle-

missed by B mode US. The shortcoming of ultrasound is its inability to evaluate intracranial vasculature, missing tandem lesions and its inability to assess densely calcified plaque. Critical carotid bifurcation stenosis diagnose by CDU have higher sensitivity and specificity.<sup>4</sup>

Few recent studies have now showed that CDU is better or even superior to CT angiography.

In this study, an endeavor to document the cases of carotid artery plaque and to correlate the characteristics of the plaque and percentage of stenosis with that of neurological symptoms and/or infarcts on CT scan.

## MATERIAL AND METHODS

This prospective study was conducted on 50 patients, who were referred to the Radio diagnosis, Department of N.S.C.B. Medical College & Jabalpur over a period of one year (2012-2013). The patients evaluated with a history, clinical examination and basic investigation and the details documented in predesigned proforma. 50 patients were taken up for CDU only, of this 29 patients showed varying degree of stenosis or occlusion of carotid arteries and these patients are further evaluated by CT scan brain whenever possible. Cases excluded from the study in whom proper, complete examination of carotid artery was technically not possible and other non-cerebrovascular cause of TIA, and stroke was found.

### Technical Consideration

The scan was performed on a SIEMENS-SONOLINE G-50, BLoqic 3 Expert-Ay 15CUK-GE. High frequency linear transducer with a range 12 MHz's

### Technique of scanning

Patient position – Examination was done by sitting on the side of the patient who was in supine position. Tilting and rotating the head away from study side being examined, enhanced the neck exposure.

## RESULTS

We studied 50 cases in which 32% presented with TIA and 68% with stroke. On this basis, we formed two groups i.e. Group I- TIA and Group II- Stroke.

In our study age range of these cases was 18 to 80 years with overall mean range of 53(+ 6.8) years. The mean age of TIA cases were found to be 41.5 (+ 8.5 years), in this category mean age of males was 43(+ 9.6) years and for females it was 37(+ 13.5) years. In cases with stroke the mean age observed was 58.5(+ 8.4), in this category mean age of males and females were 58.4(+ 10.5) years and 58.5(+ 11.2) years respectively. The overall mean age of stroke cases 58.5(+ 8.4) was significantly higher compared with TIA cases 41.5(+ 8.5) years ( $p < 0.05$ ). Out of total cases, 64% of the cases were above 50 years of age and maximum cases (48%) were between 50-70 years.

The most common risk factor was hypertension in 48% cases followed by smoking in 24%, IHD in 20%, diabetes in 16% and alcohol in 12% cases. The risk factor of alcohol and hypertension was found to be more significantly associated

with TIA ( $p < 0.05$ ).

TIA showing the presence of plaque is 34.3 % ( 11 arteries out of the total 32). Similarly, in cases with stroke, we observed plaque in 45.5% (31 arteries out of the 68 arteries) and the overall prevalence of plaque in symptomatic cases was found to be 42%. (In 13 bilateral cases, 26 arteries had plaques). However, there was no significant difference between TIA and stroke cases.

Further, we observed that 48% of plaque was bilateral, 44% were ipsi-lateral and only 7% were contra-lateral. These findings show that the probability of plaque on the same side i.e. ipsi-lateral compared with contra-lateral was significantly higher ( $p < 0.0001$ ).

The type I and II plaque were more prevalent having 40%, 25.9%, 20% and 33.3% respectively for both TIA and stroke. Type III was found in 10% and 14.8% of both categories (Table 1). The proportion of type I and II plaque was considerably higher 59.4% as compared to other type of plaque in symptomatic cases ( $p < 0.001$ ). The type I, II and III plaque are predominantly observed with significant stenosis (i.e. stenosis > 50%) while the type IV and V plaques were mainly found with less degree of stenosis (i.e. less than 50%). Thus, we can say that the type I, II and III are highly associated with significant stenosis (Table 2).

We observed 43% of homogenous plaques, while heterogeneous plaques were seen in 57 % cases. We also observed that heterogeneous plaque were 44 % in TIA and 53.5% in stroke patient and Homogenous plaque were in 55.6% TIA and 57.1% stroke patients.

We observed 56% of smooth plaques, 2.5% ulcerated plaque while irregular plaque were seen in 41% cases. The proportion of smooth plaque was slightly higher than irregular and ulcerated plaque. We also observed that smooth plaque were seen in 62% TIA and 54.8% stroke patients and irregular plaques were seen in 37% TIA and 41.9 stroke patients (Table 3).

In homogenous plaque category 77.7% plaques observed with < 50% stenosis, 22.2% with 50-69% stenosis and no case for higher occlusion were found. In heterogeneous plaque category 47.3% plaques observed with < 50% stenosis, and 21% cases were with 50-69% stenosis, 21% cases with > 70% to near occlusion and 5% cases with near occlusion and with total occlusion each. The heterogeneous plaques were seen associated with higher percentage stenosis compared to homogenous plaques. Statistically this finding shows significance with  $\chi^2 = 3.95$  and  $p < 0.05$ .

It is clearly evident that < 50% stenosis cases show 83.3% smooth plaque surface and only 16.6% were found with irregular surface. In 50-69% stenosis category 62.5% was found with irregular surface. In > 70% to near occlusion stenosis category 83.3% plaque were observed with irregular surface and in both near occlusion and total occlusion category 100% were seen with irregular surface. This finding is statistically highly significant  $\chi^2 = 13.45$ , at  $p < 0.001$ . It shows that the percentage stenosis increases the chances of irregular surface increase.

Out of the total 41 arteries 65.1 % were observed with less

than 125 cm/sec and the corresponding stenosis was <50%. In 18.6 % cases the PSV was seen in 125-230 cm/sec range and the stenosis was found 50-69%. 11.6% case were with more than 230cm/sec giving >70% to near occlusion stenosis.

While 34.9% cases were found with more than 50% stenosis and their corresponding PSV seen was 125cm/sec or more. IMT for cases with <50% stenosis was found 0.88+ 0.19, for 50-69% it was 1.17+ 0.83, for >70%to near occlusion IMT was 1.3+ 0.063, the IMT for near occlusion was 1.36+ 0.065 and for total occlusion it was 1.43+ 0.158. The mean IMT was significantly higher for significant stenosis i.e. more than 50% (p<0.05)(Table 4).

We observed 16 cases with lacunar infarct, 12 cases with non-lacunar infarct and 3 cases were normal. Majority of lacunar infarct were observed with stenosis <70% and all the cases with normal CT findings were reported with <50% stenosis, while the majority of non-lacunar findings show stenosis >70% (75% of total). There was a significant positive linear relationship of higher percentage stenosis for the non-lacunar infarct CT findings (p<0.05).

CT findings have been correlated with percentage stenosis. There were 7 CT reports with bilateral carotid stenosis, and we observed 3 cases with lacunar infarct, 2 cases with non-lacunar infarct and 2 cases were normal. The lacunar infarct and normal CT findings were primarily seen in <50% stenosis, while all the cases with non-lacunar infarct category were found with >50% stenosis. Statistically, significant findings of  $\chi^2=4.00$ ,  $p<0.05$  show that there are high chances of increased percentage stenosis i.e. more than 50% with non lacunar infarct findings of CT.

## DISCUSSION

Total 50 cases, which presented with either recent TIA or ischemic stroke, were studied. The proportion of ischemic stroke and TIA was 68% and 32% respectively.

Sempere et al<sup>5</sup> did a similar study in Spanish population from 1992 to 1994 and found incidence of 56% and 43% ischemic

stroke and TIA respectively. In our study majority of patients were between 50 to 70 years of age group with overall mean age of 53(+ 9.6) years. This is similar to study of P. Aivana-salo M, Leinene S, Turuneu J et al.<sup>6</sup>

The mean age of TIA and stroke was 41.5(+ 8.5) and 58.5(+ 8.4) respectively, this shows that mean age of stroke was significantly higher compared with TIA (p<0.05). In present study, by analyzing various risk factors, hypertension(48%) and smoking(24%) were the most common risk factors among the studied population followed by IHD (20%), diabetic (16%) and alcohol(12%). In a similar study in Jordan population,<sup>7</sup> hypertension was present in 76%, diabetes mellitus in 43%, smoking in 35% and hyper-lipidem-ia in 33% of the study population.

In the present study, 44% had unilateral ipsi-lateral plaque, 48% cases had bilateral plaque and 7% had unilateral contra-lateral plaque. Our present study shows that incidence of type I and II plaques are considerably higher (59.4%) compared to other types of plaques in symptomatic cases (p<0.001). We also found that type I, II and III plaques were predominantly observed with significant stenosis. Our observations are comparable to Mathiesen et al.<sup>8</sup>

Out of the total plaques in our study, 16(43%) were homogenous and 21(56%) were of heterogeneous type. Meskauskienė A et al<sup>9</sup> 2005 has examined Operative specimens of 262 carotid plaques macroscopically. Heterogeneous plaques were present in 198 (75%) of 262 arteries. Heterogeneous plaques were found in 121 symptomatic and 77 asymptomatic patients (p<0.001).

In the present study smooth plaque (56%) were slightly higher than irregular(41%) and ulcerated plaque (2.5%) and there was hardly any difference between prevalence of irregular and smooth surface plaque between cases of TIA and stroke. Shyamprabhakaran et al<sup>10</sup> studied 1939 stroke-free subjects Plaque surface was categorized as regular or irregular

The prevalence of heterogenous plaque was 47.3% in <50% stenosis, 21% in 50-69% stenosis, 21% in >70 to near occlusion, 5% in near total and 5% in total occlusion and Homogenous plaque prevalence was 77.7% in <50% stenosis, 22.2% in 50-69% and no case for higher percentage stenosis was found. Heterogenous plaque causes higher percentage stenosis as compared to homogenous plaque. Gerulakos et al<sup>11</sup> in 1993 reported that in plaques causing more than 70% stenosis of the carotid artery, type I and II plaques (heterogeneous plaque) are statistically predominant in the symptomatic group as compared to type III and IV plaque (Homogenous plaque).

Type of plaque	TIA (%)	Stroke (%)	Total(%)
Type I	4(40)	7(25.9)	11(29.7)
Type II	2 (20)	9(33.3)	11(29.7)
Type III	1(10)	4(14.8)	5(13.5)
Type IV	1(10)	3(11)	4(10.8)
Type V	2(20)	4(14.8)	6(16.2)

**Table-1:** Distribution of type of plaques in studied cases

Percentage of stenosis	Type of plaque(%)				
	I	II	III	IV	V
<50% (n=27)	9(64)	7(50)	2(40)	4(100)	6(100)
50-69% (n=6)	3(21)	3(15)	2(40)	0	0
>70% to near occlusion (n=5)	2(15)	3(21)	0	0	0
Near occlusion (n=2)	0	1(7)	0	0	0
Total occlusion (n=2)	0	0	1(20)	0	0
	14	14	5	4	6

**Table-2:** Distribution of type of plaque vs degree of stenosis

Plaque surface	<50% (%)	50-69% (%)	>70% to near occlusion (%)	Near occlusion	Total occlusion
Smooth	20 (83.3)	3 (37.3)	0	0	0
Irregular	4 (16.6)	5 (62.5)	5 (83.3)	1 (100)	1 (100)
Ulcerated	0	0	1 (16.6)	0	0
	24	8	6	1	1

**Table-3:** Relationship between surface characteristic of plaque and percentage stenosis

Percentage stenosis	Mean IMT(mm)
Normal	0.74 ± 0.196
<50% (n=28)	0.88 ± 0.19
50-69% (n=6)	1.17 ± 0.83
>70 % to near occlusion (n=5)	1.3 ± 0.063
Near occlusion (n=2)	1.36 ± 0.065
Total occlusion (n=2)	1.43 ± 0.158

**Table-4:** Correlation of intima media thickness with percentage stenosis

The present study show that with the increase in the degree of stenosis there was a steady increase in the number of plaques with irregular surface (16.6% in <50%, 62.5 % in 50-69%, 83.3% in >70% to near occlusion and 100% in near and total occlusion), whereas this association was reversed with the presence of smooth plaque (83.3% in <50% occlusion, 37.5 % in 50-69% and 0% in >70% occlusion). This finding was statistically significant ( $\chi^2=13.45$  at 4pdf  $p<0.001$ ) showing that as percentage of stenosis increased, chances of irregular surface plaques also increases. Baris Kanberet al<sup>12</sup> 2013, studied Parameters significantly correlated with the presence of cerebrovascular symptoms were the degree of stenosis ( $p=0.01$ ), plaque greyscale median ( $p=0.02$ ) and the plaque surface irregularity index ( $p=0.02$ ).

In the present study PSV was calculated for all degree of stenosis corresponding with stenosis standard criteria.<sup>13</sup> We found that 65.1 % with <50% stenosis and 34.9% stenotic artery with more than 50% stenosis and according to category each category has its recommended therapeutic approach according to NASCET<sup>14</sup> and ACAS.<sup>15</sup>

Our finding of mean IMT according to percentage of stenosis, normal cases show mean IMT at  $0.74 \pm 0.196$ , mean IMT for cases with <50% was found  $0.88 \pm 0.19$ , for 50-69% it was  $1.17 \pm 0.83$ , for >70% to near occlusion IMT was  $1.3 \pm 0.063$ , for near occlusion IMT was  $1.36 \pm 0.065$  and for total occlusion it was  $1.43 \pm 0.158$ mm. The mean IMT was significantly higher for all arteries with stenosis>50% ( $p<0.05$ ). Mean IMT shows a steady growth in relation with increase in stenosis, and this linear trend was found to be positively significant and it shows a positive correlation.

Lorenz MW et al<sup>16</sup> 2007, showed a consistent, positive association between common carotid artery intima media thickness and incidence of stroke. All of the non lacunar infarct occur in patients with stenosis>70%, while lacunar infarct occurred with stenosis<70%. In addition patients (100%)

with normal CT scan head insignificant stenosis(<50%). In literature, the presence of carotid stenosis>50% was significantly higher in patients with non-lacunar infarct for both the artery ipsi-lateral and contra-lateral to ischemic brain damage. Tejada et al<sup>17</sup> 2003 investigates the relationship between LI and ICAS in a large prospective study of 330 patients, including 205 with LI and 125 with NLI.

## CONCLUSION

This study evaluated CDU findings in 50 cases of TIA and stroke to assess the degree of carotid artery stenosis and an attempt was also made to compare the parameters which constitute the basic of plaque morphology i.e. plaque echogenicity, plaque texture, plaque surface.

Incidence of TIA and stroke was more in age group of 50-70 yrs with overall mean age of  $53 \pm 6.8$ . Overall mean age of stroke ( $58.5 \pm 8.4$ ) was higher than TIA ( $41.5 \pm 8.5$ ). Hypertension and smoking are the most common risk factors present in all degree of stenosis. Prevalence of carotid plaque ipsi-lateral to brain hemisphere involved is significantly higher than contra-lateral side. Prevalence of smooth plaque is more in TIA; however, irregular plaques were more prevalent in stroke patients.

We conclude by saying that there is a significant untapped, potential in Doppler analysis of carotid artery disease, and that developing noninvasive radiological characterization of various lesion characteristics would definitely revolutionize the diagnosis, evaluation and management of cerebrovascular disease.

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# The Growing Epidemic of MDR- TB and Concerns for Global Health Security

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## ABSTRACT

Global health is the health of populations in a global context and transcends the perspectives and concerns of individual nations. In 2012, half a million people were infected with the drug resistant TB, also known as multi-drug resistant-TB (MDR-TB). However, it is estimated that less than a quarter of the actual cases were properly diagnosed. The drug resistant Tuberculosis is confirmed in 37 countries including the developing and G8 countries. MDR-TB, has been recognized as a potentially catastrophic challenge to global public health since it is contagious and carry grave consequences of those who are affected. In 2001 the World Health Assembly's resolution "Global Health Security: epidemic alert and response" linked the health security concept to a global strategy for prevention of movement of communicable diseases across national borders. The biggest challenge is how to ensure that the new medicines are widely available at affordable prices to improve treatment success rates. The total economic burden of TB between 2006 and 2015 for the twenty-two high burden countries is estimated to be about \$3.4 trillion. To address this global security challenge, which costs a lot for the high burden countries, there must be a simplified TB treatment market that will allow for better and more affordable medicines, thereby transforming the lives of those still affected by the disease in a great way. To ensure the global health security, the global community must worktogether with a commitment to buildup sustainable response not limiting to outbreak containment but must strengthen health systems.

**Keywords:** Tuberculosis, MDR-TB, Global Health, Health Security, Epidemic, End TB Strategy.

## INTRODUCTION

Tuberculosis (TB) is an ancient disease that has affected mankind for more than 4,000 years. It is a chronic disease caused by the bacillus *Mycobacterium tuberculosis* and spreads from person to person through air. Global health is the health of populations in a global context and transcends the perspectives and concerns of individual nations. Global health is now considered important for national and international security, domestic and global economic wellbeing.<sup>1</sup> As per the Commission on Human Security established by the United Nations, there are seven dimensions of human security of which health security is one of them. In 2001 the World Health Assembly's resolution "Global Health Security: epidemic alert and response" linked the health security concept to a global strategy for prevention of movement of communicable diseases across national borders. This resolution supported the revision of the International Health Regulations (IHR) and was the first step in associating global health security with IHR compliance.<sup>2</sup> TB drug resistance is

characterized both by the types of drugs to which the bacteria lack susceptibility and the manner in which resistance was acquired. Resistance to single agents is the most common type; resistance to multiple agents is less frequent, but of greater concern. By convention, "multidrug resistance" (MDR) is defined as resistance to at least isoniazid and rifampin drugs. The World health Organization (WHO) has now classified MDR-TB as a global health security risk and estimates that as many as five million people will be infected with it by 2015.<sup>3</sup> It also says that a third of the total 9 million people who contract the disease in any form each year do not receive the care they need, thereby resulting in a big treatment gap. This gap leads to drug resistance spreading around the world at an alarming rate and has given rise to incurable strains of totally drug-resistant TB - which cannot be treated with any known medicines. WHO called for multidrug-resistant tuberculosis (MDR-TB) to be "recognized as a public health crisis and says the contagious, deadly superbug forms of the disease carry grave consequences for those affected".

## EPIDEMIOLOGY OF MDR-TB

In 2012, half a million people were infected with the drug resistant TB, also known as multi-drug resistant-TB (MDR-TB). However, it is estimated that less than a quarter of the actual cases were properly diagnosed. The drug resistant Tuberculosis is confirmed in 37 countries including the developing and G8 countries. MDR-TB, has been recognized as a potentially catastrophic challenge to global public health since it is contagious and the superbug forms of the disease carry grave consequences of those who are affected. Major outbreaks of MDR-TB have been reported in the former Soviet Union, and low levels of MDR-TB in countries with high rates of TB, such as Peru, have resulted in large numbers of patients with disease. As a consequence, drug-resistant TB now constitutes a global problem.<sup>4</sup> The global threat of MDR tuberculosis has great significance for the field of public health. For one thing, its very existence is a reflection of weaknesses in tuberculosis management, which should

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minimize the emergence of drug resistance.<sup>5</sup> MDR TB is a major health challenge in India that is gaining increasing public attention and the epidemic is transitioning from a treatment-generated to transmission-generated epidemic. The challenge of addressing TB and MDR TB is critical for India, which is home to over 25% of world's TB cases.<sup>6</sup> In 1997, the Revised National Tuberculosis Control Programme (RNTCP) implemented the World Health Organization's (WHO) Directly Observed Treatment Short-Course (DOTS) strategy and DOTS-Plus program for systematic treatment of MDR TB in 2007, though population coverage with DOTS-Plus had only reached 26% in 2011.<sup>7</sup> As the treatment of MDR TB is more complex than drug sensitive TB, and as access to laboratory facilities is needed for diagnosis, the actual provision of the MDR TB services was to be carried out in designated DOTS-Plus sites. Although the aim was to treat 30,000 MDR TB cases annually by 2012-2013, by the end of 2011, just 10,267 MDR patients had been diagnosed, and only 6,994 were provided treatment. However, it is becoming clear that progress is being made, as in Mumbai it was said in June 2013 that 3,600 patients were being treated for MDR TB, whereas two years earlier Mumbai was treating only 280 such patients. In Tamil Nadu, India, 3.4% of new cases had MDR-TB, the prevalence of isoniazid resistance was found in 15%, and rifampin resistance in 4.4%. Various studies have found MDR TB levels of about 3% in new cases and around 12-17% in retreatment cases. However, even if there are such a small percentage of cases, it still translates into large absolute numbers in India. As per TB India Annual report of 2014, a total of 23289 cases of MDR TB were diagnosed of which 20763 were put on treatment however mortality and default are still around 20% each in 2013. Airborne infection control is crucial for preventing the spread of TB from person to person, as well as reducing the risk of TB among health workers in institutional settings. Private clinics in India are often used by patients seeking TB treatment and may employ treatment regimens not recommended by national or international guidelines with resulting suboptimal effectiveness<sup>8</sup>, potentially generating MDR TB'. One of the key obstacles in dealing with drug resistance strains effectively is that lot of patients who got infected were unaware of it or getting the wrong treatment or not at all treated. Moreover the rising healthcare costs make the poor countries unable to cope up with the challenging situation. There are places where the samples are sent to other regions for testing, sometimes as they have only one central laboratory with limited capacity to diagnose the MDR-TB.

### END TB STRATEGY 2015

The WHO's "End TB Strategy" for the World TB day 2015 envisions a world free of TB with zero deaths, disease and suffering. It sets targets and outlines actions for governments and partners to provide patient-centered care, pursue policies and systems that enable prevention and care, and drive research and innovations needed to end the epidemic and eliminate TB. The best information on the global TB comes from the WHO, with South East Asia holding the highest number

of people infected with TB in the world. The worldwide annual incidence continues to increase in Africa with 85% new cases because of the HIV/AIDS epidemic.<sup>9</sup>

WHO estimates that at least one third of the nearly 36 million of people living with HIV/AIDS (PLHIVs) are also infected with TB. Since TB is the top cause of death among PLHIVs in sub-Saharan Africa, to achieve the millennium development goal of a 50% reduction of TB related deaths is an integral to achieve an AIDS-free generation.<sup>10</sup> In 2014, WHO director general Margaret Chan made a statement that "Earlier and faster diagnosis of all forms of TB is vital," as it improves the chances of people getting the right treatment and being cured, and it helps stop spread of drug-resistant disease.

### ADVANCES IN MDR-TB MANAGEMENT

There is a need for evidence based interventions that can be implemented to treat the established infections and prevent the new ones from happening.<sup>11</sup> WHO is taking serious action to try and control MDR-TB. New tests have been developed that are able to diagnose TB much quicker. However, it is difficult to get the technology to areas of the globe which need it most. The 2014 World TB Day focused on the three million people who were infected with TB and "missed" by health systems. Through UNITAID-funded projects implemented by the World Health Organization (WHO) and the Stop TB Partnership, more patients are being identified in high-burden countries. These initiatives have scaled up lab-based services and introduced new rapid technologies which shorten the time to diagnose drug-resistant strains of TB from weeks to only a few hours. EXPAND-TB (Expanding Access to New Diagnostics for TB) is an international project created to help raise awareness of and fight against the TB superbug. Countries involved with the program have seen their numbers of diagnosed cases of TB tripled. UNITAID has made grants to the EXPAND-TB project which is providing state-of-the-art testing facilities to 100 labs in 27 high burden countries with 40% of the problem, and through its TBxPERT project which has brought 220 state-of-the-art GeneXpert machines to 21 countries and a 40% price reduction for the test cartridges, for 145 countries. During 2009 to 2013, the number of MDR-TB cases diagnosed in these countries tripled and with the help of this project, it has enabled more patients to be treated with second-line TB medicines and has helped reduce the price of these medicines by one-third.

In 2013, the US Food and Drug Administration (FDA) approved the first new TB medicine (Sirturo or bedaquiline) in over 40 years which works by inhibiting an enzyme needed by M. Tuberculosis to replicate and spread throughout the body. Recently the European Medicines Agency (EMA) granted temporary approval of a second MDR-TB drug (Delamanid or Deltyba), and new shorter regimens lasting only nine months are showing great potential. Delamanid is a dihydro-nitroimidazooxazole and acts by inhibiting the synthesis of cell wall components, methoxy mycolic acid and keto mycolic acid. Medicines for the 500,000 annual pedi-

atric total TB cases also remain a particular issue, with none currently available that meet WHO guidelines. There is a great need to develop adapted formulations and make them available as quickly as possible.<sup>12</sup> The biggest challenge is how to ensure that these new medicines are widely available at affordable prices to improve treatment success rates. The total economic burden of TB between 2006 and 2015 for the twenty-two high burden countries is estimated to be about \$3.4 trillion. To address this global security challenge, which costs a lot for the high burden countries, there must be a simplified TB treatment market that will allow for better and more affordable medicines, thereby transforming the lives of those still affected by the disease in a great way.

## CONCLUSIONS

The emerging MDR TB suggests that there is a failure to implement the measures recommended by WHO's STOP TB Strategy which emphasizes expanding the high quality DOTS programs, strengthening healthcare systems, addressing HIV associated TB and drug resistance and encouraging all providers to follow the good practices and the standard guidelines. In countries with low MDR-TB, efforts should be concentrated on preventing acquired MDR-TB by widely implementing the WHO DOTS strategy and in places with high MDR-TB, management efforts should tailor treatment by performing drug susceptibility testing. The development of better and more rapid diagnostic assays and new classes of anti-TB drugs are urgent priorities for the containment of MDR-TB. To ensure the global health security, the global community must work together with a commitment to build-up sustainable response not limiting to outbreak containment but must strengthen health systems. The nations should emphasize and put in practice the unequivocal statement of the WHO that "functioning health systems are the bedrock of health security"

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# Assessment of Serum Paraoxonase1 Activity in Diabetic Retinopathy Patients

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## ABSTRACT

**Introduction:** Diabetic retinopathy (DR), a major microvascular complication of diabetes mellitus comprises of characteristic group of lesions occurring in the retina leading to preventable blindness. Paraoxonase1 (PON1), an enzyme attached to High Density Lipoprotein (HDL) is known to enhance the antioxidant and anti-inflammatory role of HDL and prevents Low Density Lipoprotein (LDL) peroxidation, thus may prevent the complications of Diabetes Mellitus. The present study was undertaken to estimate serum PON1, lipid profile in diabetic retinopathy patients.

**Material and Methods:** Study subjects consisted of 30 clinically diagnosed cases of Diabetic retinopathy, 90 cases of type 2 Diabetes Mellitus (T2DM) and 90 age sex matched healthy controls. In all study population lipid profile were estimated on AutoQuanta 400 Merilyzer and serum basal PON1 activity and salt stimulated PON1 activity by spectrophotometric method.

**Results:** A significantly lower levels of basal and salt stimulated PON1 activity was seen in diabetic patients with and without DR ( $p < 0.0001$ ). Also a significant decrease in basal PON1 ( $p = 0.0001$ ) and salt stimulated PON1 activity ( $p = 0.0491$ ) was observed in DR patients compared to T2DM patients. Significant increase in total cholesterol ( $p = 0.016$ ), triglycerides ( $p = 0.002$ ), LDL ( $p = 0.005$ ) and Very Low Density Lipoprotein ( $p = 0.002$ ) was seen in diabetic patients with and without DR. There was no significant difference in lipid profile between T2DM and DR patients. In Discriminantfunction analysis, PPPG was more significantly influencing the DR (score 1.159).

**Conclusion:** T2DM have reduced PON1 activity which is further reduced in DR patients along with dyslipidemia which may play a significant role in pathogenesis of retinopathy. Thus estimation of PON1 may help in risk assessment of DR in T2DM.

**Keywords:** Dyslipidemia, Diabetic Retinopathy, Paraoxonase1.

## INTRODUCTION

Diabetes mellitus (DM), a chronic metabolic disease is on epidemic rise even in developing countries like India. The International Diabetic Federation (IDF) has predicted that the prevalence of DM patients will rise from 65.1 million in 2013 to 109 million in 2035 in India.<sup>1</sup>

Diabetic Retinopathy (DR) is a major microvascular complication of DM comprising of characteristic lesions occurring in the retina of an individual. Based on the types of lesions DR may range from non proliferative Diabetic Retinopathy (NPDR), proliferative Diabetic Retinopathy (PDR) and diabetic macular oedema (DME).

DR has a significant impact on world health system resulting in blindness of over 10,000 people with diabetes per year.<sup>2</sup> In the developed countries it is the major cause of preventable blindness in working adult age group.<sup>3</sup>

The prevalence of DR in India has been reported variedly ranging from 10.3%<sup>1</sup> to as high as 34.1%.<sup>4</sup> The Chennai Urban Rural Epidemiology (CURES) Eye Study, a study in south India reported prevalence of 17.6% in DM patients in South India.<sup>5</sup>

The predominant risk factors for development and progression of DR is the duration of DM, degree of hyperglycemia and dyslipidemias.<sup>4</sup> Dyslipidemias potentially contributes to the development of DR. Hard exudates in retinopathy patients are associated with high levels of total cholesterol (TC) and low density lipoprotein (LDL).<sup>2</sup> Increase in lipid peroxides occurring due to poor glycemic control may contribute to the development of microangiopathies in DM.<sup>6</sup> Oxidised LDL (oxLDL) is cytotoxic to retinal capillary endothelial cells and pericytes contributing to pathogenesis of DR.<sup>7</sup>

High Homocysteine and homocysteine thiolactone (HCTL) causes homocysteinylation and loss of protein function leading to increase risk of development and progression of microvascular complications of DM.<sup>8</sup>

Paraoxonase (PON) is an arylalkyl phosphatase (EC: 3.1.8.1) having both arylesterase and lactonase activity which hydrolyses HCTL.<sup>7,9</sup> It is a calcium dependent 43KDa enzyme, a transcriptional product of gene present on chromosome 7q21-22. The gene family codes for three-isoenzymes PON1, PON2 and PON3.<sup>8</sup> The PON1 enzyme is closely associated with HDL, located on subfraction that contains Apo A1 and clusterin (Apo J).<sup>10</sup> The antioxidant and anti-inflammatory role of HDL is attributed to the ability of paraoxonase1 (PON1) enzyme to hydrolyze the oxidized phospholipids and hydroperoxides of oxLDL.

Many studies have shown decrease in PON1 activity in DM.<sup>11</sup> However there are limited studies associating decreased serum paraoxonase1 levels with diabetic retinopathy. The present study was undertaken to evaluate the serum

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	Controls Group I N= 90	T2DM Group II N= 90	DR Group III N= 30	Overall P value	Significance P value		
					Group I - Group II	Group I - Group III	Group II- Group III
Age	54.49±7.23	56.44±14.07	60.53±11.12	0.060	0.177	0.0008*	0.075
Female/Male(%)	43.3/56.7	43.3/56.7	46.7/53.3	0.4353	1	0.83	0.83
FPG (mg/dl)	91.77±13.35	174.43±67.96	219.7±101.12	<0.0001	<0.001**	<0.001**	0.040*
PPPG (mg/dl)	122.43±15	236.53±86.45	341.73±94.44	<0.0001	<0.001**	<0.001**	<0.001**
TC (mg/dl)	181.03±32.66	193.33±39.41	211.3±46.42	0.016	0.460	0.012*	0.199
TG (mg/dl)	157.33±66.01	220.87±77.56	213.30±74	0.002	0.003**	0.010**	0.912
HDL (mg/dl)	44±8.82	39.47±10.78	39.7±10.93	0.160	0.204	0.239	0.996
VLDL (mg/dl)	31.1±13.15	43.63±15.37	42.26±14.87	0.002	0.003**	0.010**	0.929
LDL (mg/dl)	105.57±32.64	115.03±41.77	137.20±38.15	0.005	0.596	0.005**	0.063+

\*\*Highly significant, \*Significant, FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose, TC: Total cholesterol, TG: Triacylglycerol, HDL: High-density lipoproteins, VLDL: Very low density lipoproteins, LDL: Low density lipoproteins.

**Table-1:** Demographic and Biochemical parameters in the three groups

DM Duration (years)*	T2DM cases	DR cases
Recently diagnosed	0.0	3.3
1-2	26.7	0.0
3-5	26.7	23.3
5-10	40.0	56.7
>10	6.7	16.7
Mean duration of DM in yrs <sup>+</sup>	6.2±5.5	8.3±4.8

\*P=0.011, Significant, Fisher exact test  
+ -not significant  
DM – Diabetes Mellitus, DR – Diabetic Retinopathy

**Table-2:** DM Duration (%)

paraoxonase I activity and any concurrent dyslipidemia in DR patients.

## MATERIAL AND METHODS

A cross sectional study was carried at Adichunchanagiri Institute of medical sciences, BG Nagara. The study population consisted of 210 subjects comprising of 90 healthy subjects on routine check up (Group I), 90 cases of Type 2 DM (T2DM)(Group II) and 30 cases of DM with retinopathy complication (DR) diagnosed clinically by fundus examination of both the eyes by direct ophthalmoscopy (Group III). Patients with chronic renal diseases, liver diseases, smokers, heart diseases, stroke, patients on lipid lowering agents, under 18 patients, pregnant women and psychiatric patients were excluded from the study. The study was approved by the institutional ethical committee.

After an overnight fast, 5ml of blood sample was withdrawn aseptically from all subjects for estimation of fasting blood sugar (FBS), lipid profile, basal PON1 activity and salt stimulated PON1 activity. 2ml of blood sample was taken 2 hours of taking the meal to estimate postprandial blood sugar (PPBG).

Plasma Glucose (Trinder's method), serum total cholesterol (TC) (CHOD-PAP method), High density lipoprotein (HDL), Low Density Lipoprotein (LDL) and Triglycerides (TG)(Glycerol phosphate oxidase method) were measured by using standard kits on Autoquanta 400 Merilyzer. Very low density lipoprotein (VLDL) was calculated by dividing TG with five (TG/5) when TG level was less than 400mg/dl.

Serum PON1 activity was measured spectrophotometrically using phenyl acetate as substrate.<sup>12</sup> Basal PON1 activity was measured by monitoring the rate of formation of phenol from phenyl acetate in Tris-HCl –CaCl<sub>2</sub> by PON1 at 412nm. The salt stimulated PON1 activity was measured by adding 1M NaCl to the reagents.

## STATISTICAL ANALYSIS

The continuous variables are presented as mean ± SD and categorical variables as percentage. Analysis of variance (ANOVA) test was used to test the statistical difference between the multiple groups and student unpaired t test was used to assess the difference between two groups. Chi-square test and Fisher exact test were done for categorical variable. Significance is assessed at 5 % level of significance.

## RESULTS

Table 1 shows the demographic, plasma glucose and lipid profile data in the three groups. Even though statistically there was no difference in the mean age, but diabetic retinopathy patients were older. There was significantly higher levels of TC, TG, VLDL and LDL levels in diabetic patients and diabetic retinopathy patients. However there was no significant change in HDL levels between the three groups as well as no significant difference in lipid profile between Diabetic patients and Diabetic patients complicated by retinopathy.

Table 2 shows duration of Diabetes in the diabetic and diabetic retinopathy groups with significantly higher number of diabetic retinopathy patients in longer DM duration (p=0.011). All the retinopathy patients were of non proliferative diabetic retinopathy grade and among them 60% had Mild NPDR, 30% had moderate NPDR and 10% had severe NPDR.

Table 3 compares the basal PON activity and Salt stimulated activity between the three groups. There was highly significant decrease in both basal and salt stimulated PON activity in diabetes and diabetic retinopathy patients. Also there was significant decrease in PON activity in retinopathy patients when compared to diabetic patients without retinopathy. Discriminating analysis was employed to find the significant

	Controls Group I	T2DM Group II	DR Group III	p	Significance P value		
					Group I - Group II	Group I - Group III	Group II - Group III
Basal PON1	67.4±12.14	34.46±17.88	24.8±10.96	0.0001**	0.0001**	0.0001**	0.0001**
Salt Stimulated PON1	76.28±12.97	46.40±20.1	37.9±11.18	0.0001**	0.0001**	0.0001**	0.0491**

\*\*Highly significant, PON1: Paraoxonase I

**Table-3:** Comparison of PON levels in three groups studied with post-hoc test

	Wilk's Lambda	F	df1	df2	Sig.
Age	0.920	10.211	1	118	0.002
TC	0.904	12.519	1	118	0.001
TG	0.726	44.486	1	118	0.000
HDL	0.908	11.943	1	118	0.001
LDL	0.888	14.930	1	118	0.000
VLDL	0.728	44.136	1	118	0.000
FPG	0.438	151.148	1	118	0.000
PPPG	0.192	495.275	1	118	0.000
Basal PON1	0.297	279.074	1	118	0.000
Salt Stimulated PON1	0.360	210.209	1	118	0.000

FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose, TC: Total cholesterol, TG: Triacylglycerol, HDL: High-density lipoproteins, VLDL: Very low density lipoproteins, LDL: Low density lipoproteins, PON1: Paraoxonase I

**Table-4:** Descriptive analysis: Test of Equality of Group means

	Function 1
Age	0.116
TC	-0.430
TG	0.654
HDL	0.051
LDL	0.617
VLDL	-0.343
FPG	-0.564
PPPG	1.159
Basal PON1	-0.385
Salt Stimulated PON1	-0.161

FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose, TC: Total cholesterol, TG: Triacylglycerol, HDL: High-density lipoproteins, VLDL: Very low density lipoproteins, LDL: Low density lipoproteins, PON1: Paraoxonase I

**Table-5:** Results of Discriminant Function analysis: Standardized Canonical Discriminant Function coefficient

factors predicting the DR, all the variables are significant (Table 4), as per Table 5, the PPPG is more significantly influencing the DR (score 1.159), followed by TG (0.654), FPG (-0.584), TC (-0.430) and basal PON with -0.385.

**DISCUSSION**

Diabetic retinopathy is a common complication of diabetes mellitus which occurs due to damage of microvasculature of retina of eyes. Studies have shown after 15-20 years of duration of DM, almost all type 1 DM and nearly 75% of type 2 DM would have developed DR.<sup>4</sup>

The pathophysiological mechanism for development of DR is multifactorial. It may be directly associated with the age of onset of DM, duration of DM and degree of control of glycemia.<sup>6</sup> There may also be a genetic predisposition.<sup>2</sup> Hyperglycemia may damage the retinal vessels by a number of mechanisms including increased polyol pathway, increased formation and damage by advanced glycation end products, activation of adverse cellular metabolic pathways via protein kinase C, increased oxidative stress etc.<sup>6</sup>

Oxidized LDL may play a key role in pathogenesis and progression of DR by damaging retinal capillary endothelial cells and pericytes.<sup>7</sup> HDL prevents LDL oxidation through its antioxidant and anti-inflammatory properties by PON1 hydrolytic activity. PON1 decreases the lipid peroxides on LDL.<sup>7</sup>

In our earlier study we had demonstrated decrease in PON1 activity in DM patients.<sup>13</sup> Further decrease in PON1 activity has been reported in diabetic patients with complication.<sup>10,12</sup> Hyperglycemia may have a direct role in reducing PON1 activity due to glycation and glyoxidation of both HDL and paraoxonase enzyme.<sup>14</sup>

Nowak M et al<sup>9</sup>, reported significant decrease in PON1 activity in DR patients with also a significant decrease in PON1/CRP ratio. In the present study the basal and salt stimulated serum PON1 was significantly reduced (p<0.0001) in all diabetic patients with and without DR. Further there was significantly reduced basal and salt stimulated PON1 activities in DR patients compared to T2DM patients without retinopathy (p<0.0001 and p=0.0491 respectively). Our study was in accordance to studies by Mackness B et al.<sup>7</sup> Similar findings were echoed in studies conducted by Hampe MH et al.<sup>6</sup> They also concluded that PON1 arylesterase activity as demonstrated by phenyl acetate hydrolytic activity may be more important in risk assessment of DR. Both these studies also demonstrated that subjects with PON RR phenotype [having arginine instead of glutamine (QQ type) at 192 position] are at higher risk of development of retinopathy.

Dyslipidemia is another major contributor for the development of diabetic complications. Yo-Chen Chang et al<sup>3</sup>, in review of 19 studies on association of dyslipidemia in DR, found inconsistent results. However they also reviewed studies on lipid lowering therapies in DR cases and concluded that lipid lowering therapy may be an effective adjunct in management of DR especially in patients with diabetic macular oedema requiring laser therapy.

In the present study there was significant increase in TC (p<0.016), TG (p<0.002), LDL (p<0.005) and VLDL (p<0.002) levels in diabetic patients compared to controls although there was no significant difference between HDL lev-

els ( $p=0.160$ ). But there was no significant difference in lipid parameters in DM patients with and without retinopathy.

Agroiya P et al<sup>15</sup> reported significant changes in LDL, HDL and TG levels in DR patients. In another study by Mathur A et al<sup>16</sup>, diabetic patients had higher levels of TC, LDL and TG levels with lower HDL levels. They also found difference in TG level between DM and DR patients. However Ebru Nevin Cetin et al<sup>17</sup>, found no difference in lipid profile between diabetic patients without DR and patients with various grades of DR even though they found significant correlation between mean blood glucose and HbA1c with various lipid species.

## CONCLUSION

In conclusion serum PON1 activity was decreased in diabetic patients which was further reduced in DR patients thus reducing the protective role of HDL on prevention of LDL peroxidation. Added to this is diabetic patients are high risk group in terms of dyslipidemia with increased atherogenic lipids and decreased antiatherogenic lipids. Thus evaluation of PON1 may help in risk assessment and management of DR patients.

Further studies with large sample size are warranted to establish the role of PON1 and its polymorphism in pathogenesis of retinopathy.

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# Odontogenic Keratocyst (OKC) as Tumor: A Surgeons Dilemma between Resection and Recurrence

Vivek Kumar<sup>1</sup>, Avanindra Kumar<sup>2</sup>, Soumen Mandal<sup>3</sup>, Anupam Kumar<sup>4</sup>

## ABSTRACT

**Introduction:** Keratocystic odontogenic tumours (KCOTs) are benign but locally aggressive lesions with high propensity to recurrence with Aggressive growth, within the jaws and tendency to invade surrounding anatomical structures.

**Case Report:** The article presents a case report of very commonly happened case of the recurrence of KCOTs after conservative approach, like marsupialization or curettage in the treatment of cyst like small OKC in day to day practice along with the treatment modalities. The case of recurrence KCOTs, shows the degenerative nature of tumor in a short period of time after operation. A 28 years old female having history of extraction of third molar followed by curettage of cyst done just 2.5 years back.

**Conclusion:** The postoperative course was uneventful. The patient has been checked regularly for more than 3 years without any sign of recurrence

**Keywords:-** Odontogenic keratocyst (OKC), Keratocystic odontogenic tumor (KCOTs), Orthokeratinization, Marsupialization.

also present as a multilocular radiolucency with a ratio of unilocular to multilocular varying from 3:1 to 1:1.3.<sup>7,9</sup>

## Common Treatment Modalities

Morgan and colleagues categorize surgical treatment methods for KCOT as conservative or aggressive.<sup>15</sup> Conservative treatment is cyst-oriented and, thus, includes enucleation, with or without curettage, or marsupialization.<sup>5,16</sup> Aggressive treatment addresses the neoplastic nature of the KCOT and includes peripheral ostectomy, chemical curettage with Carnoy's solution or en-bloc resection.

Some authors advocate a site and size based approach to KCOT treatment planning. For example, Dammer R. and co workers suggest that "small OKC of 1 cm in diameter should be treated by simple excision, but large OKC near the base of the skull which should be treated by radical excision".<sup>17</sup> This is presumably because of the potential for local invasion of the skull base, which can have catastrophic consequences. With surgical treatment, removal of the mucosa overlying the lesion has been recommended, based on histologic evidence that clusters of epithelial islands and microcysts presumably with the potential to cause recurrence have been found in the area where the KCOT was connected with the mucosa.<sup>18</sup>

## INTRODUCTION

The odontogenic keratocyst (OKC) was first described in 1876 and the name proposed by Phillipson in 1956.<sup>1</sup> It is one of the most aggressive odontogenic cysts of the oral cavity.<sup>2</sup> Due to neoplastic nature World Health Organization (WHO) recognized OKC as keratocystic odontogenic tumour (KCOT-2005). Keratocystic Odontogenic Tumors (KCOTs) is defined as a benign, odontogenic, uni- or multicystic intraosseous tumors, with characteristic parakeratinized stratified squamous epithelium lining, having a potential for aggressive and infiltrative behavior (growth).<sup>3</sup> However, since KCOTs also exhibit some cysts-like features, including response to decompression.<sup>4</sup> KCOTs comprise approximately 11% of all cysts of the jaws<sup>5</sup>, and almost always occur within bone, although a small number of cases of peripheral KCOT have been reported.<sup>4</sup> Around 40% to 60% of KCOTs are diagnosed in patients in their 2nd and 3rd decade of life. In some studies, bimodal age distribution has been noted, with highest number of cases in patients aging from 10 to 19 and from 20 to 29 years, just to be followed by another rise in a group of those from 50 to 64 years of life.<sup>6</sup> The distribution between sexes varies from equality to a male to female ratio of 1.6:1, except children.<sup>7,9-11</sup> Odontogenic keratocyst may occur in any part of the upper and lower jaw with the majority occurring in the mandible, most commonly in the angle and ramus of the mandible.<sup>7,8,10-13</sup> Radiographically, odontogenic keratocyst present predominantly as a unilocular radiolucency with well-developed sclerotic borders. They may

## RESULT

A review of the literature suggests that recurrence rate is relatively low with aggressive treatment, whereas more conservative methods tend to result in more recurrences. First, enucleation along with Carnoy's solution, with or without peripheral ostectomy results in a significantly lower rate of recurrence than enucleation alone. Second, the use of cryotherapy with enucleation appears to have no significant effect on the recurrence rate compared with enucleation alone. Third, marsupialization as a definitive treatment is associated with a significantly higher recurrence rate than when the KCOT is subsequently enucleated. Finally, resection, despite

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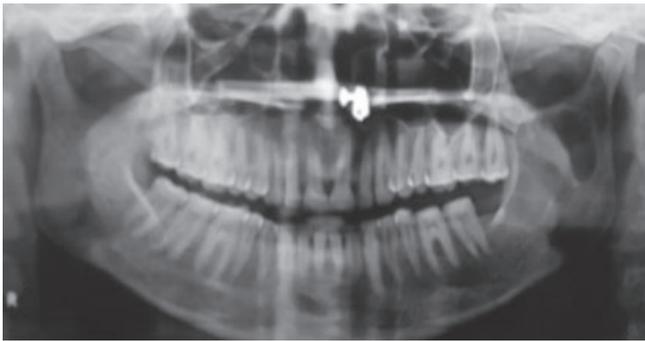


Figure-1: pre operative

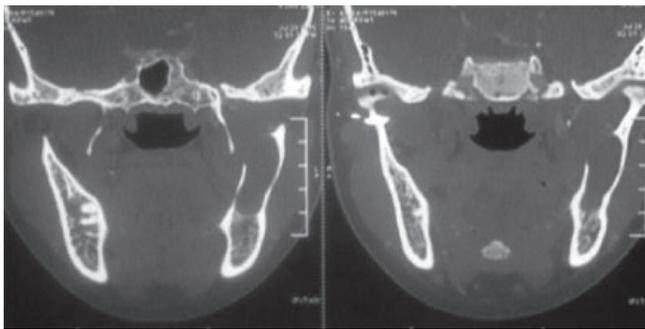


Figure-2: pre operative CTF

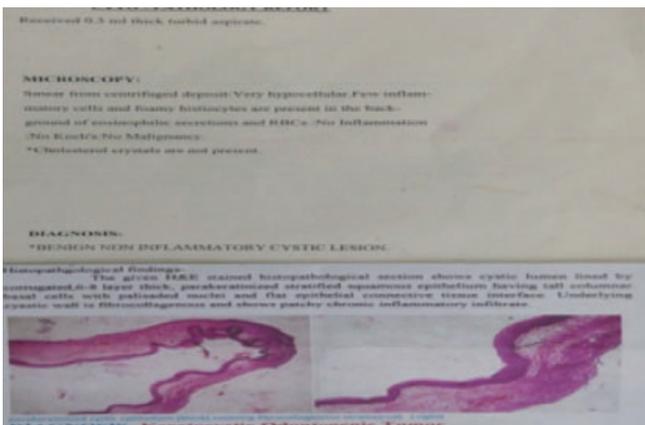


Figure-3: pre operative



Figure-4: 6 month post op.

a recurrence rate of about zero, is not significantly better at eliminating recurrences than enucleation plus Carnoy's solution or marsupialization plus cystectomy. Therefore, to minimize invasiveness and recurrence, the

most effective treatment option appears to be enucleation of the KCOT and subsequent application of Carnoy's solution. Alternatively, marsupialization followed by cystectomy is likewise effective.<sup>19</sup>

**CASE REPORT**

A 28-year-old female patient reported to a department of oral and maxillofacial surgery in Dr B. R Ambedkar institute of dental science and hospital with complain of pain and swelling in the left facial region, along with pus discharge from left lower posterior tooth region for last one year.

Patient was alright one year back when she noticed intraoral swelling digital to left lower second molar tooth with some fluid discharge from same region of mouth. Pain present over left lower border of mandible to auricular region during mouth opening. Pain was subsided by the unknown medication. She gave history of extraction of third molar along with removal of cyst in a single surgical procedure, about two and half years back. Clinical examination revealed intra oral swelling present digital to second molar in the 3<sup>rd</sup> quadrant, with sinus opening which was fluctuant on palpation. Bilaterally condylar movement was felt properly, but mouth opening limited to 20 mm. limited mouth opening was most probably due to pain. Diagnostic records included orthopantomogram (OPG), CT face for rule out of any maxillofacial pathology involving mandible or other facial bone. Based on the above findings and Panoramic radiograph demonstrated a well-demarcated unilocular radiolucency with well-developed sclerotic border on left ramus of mandible from angle to coronoid notch (Fig 1). Computed tomography also demonstrate cystic lesion in the left ramus of mandible (Fig 2). FNAC report also conforms the above mention case was benign non inflammatory cyst (Fig-3).

Due to the anatomy and recurrence nature of cyst we follow the most effective treatment option i.e enucleation of the cyst and subsequent application of Carnoy's solution under general anesthesia. The removed specimen was sent for histopathology, and the report conform KCOTs(Fig-3).

The postoperative course was uneventful. The patient has been checked regularly for more than 3 years without any sign of recurrence (Fig-4).

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# Comparative Evaluation of Effect of Different Dairy Products on Salivary pH – An In-Vivo Study

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## ABSTRACT

**Introduction:** Milk and milk products are an important part of the human diet. Especially for children it is the only source of essential nutrients. Consuming dairy products is vital to maintaining good overall health. In 1958, the Research Committee of the Canadian Dental Association (1958) reviewed the evidence that milk consumption was associated with a reduction in caries incidence. However, there has been little research about how dairy products affect oral health in particular. Aim of the study was to evaluate the effect of different dairy products on the oral health of children between the age of 6 to 12yrs.

**Material and Method:** Forty caries free children in the age group of 6-12 years were selected and divided randomly into 4 groups. Group I was given sugar free milk, Group II was given sugar free yogurt and Group III was given processed cheese and Group IV served as the control group and was given paraffin to chew. After determining the resting salivary pH using digital salivary pH meter, each group consumed their product for three minutes and then swished with water. pH level of each subject's saliva was measured again at an interval of 10, 20 and 30 minutes to record the time taken for the salivary pH to come to the baseline values after consuming different dairy products.

**Results:** Subjects who ate cheese showed a rapid increase in pH levels at each time interval, suggesting that cheese has anti- caries property.

**Conclusion:** Dairy products without added sugar can be recommended as after meal, especially to school children, which would help to reduce the incidence of dental caries.

**Keywords:** Dental Caries, Milk Products, Salivary pH

## INTRODUCTION

Dairy products are recognized as an important for one's overall and dental health.<sup>1</sup> There is sufficient evidence regarding the effect of saliva in controlling plaque pH, and that stimulation of saliva by foods is an important factor in determining their acidogenic potential. This is especially important when saliva is stimulated after plaque pH is lowered by an acidogenic challenge. Chewing of certain foods, such as dairy products promotes a rapid recovery of plaque pH following an acidogenic challenge thereby exerting a caries protective effect.<sup>1</sup>

Dental caries is an infectious and nutrition-related disease. Eating patterns and especially consumption of sugar rich foods between meals can result in tooth decay.<sup>2</sup> Diet counselling forms an important part of preventive dentistry and as dentists are encountered with caries-prone patients they are increasingly called upon to identify and give advice on foods that inhibit and reduce the carious process, rather than,

systemic nutritional counselling for developing a caries free tooth.

Prevention of excess sucrose consumption appears to be a reasonable component of a caries prevention program. Yet, there is presently no evidence demonstrating the effectiveness of this restrictive approach of dietary counselling on caries reduction in children due to poor compliance. Although dairy products are proven to be caries protective foods, individuals make food choices in the context of their culture, region and owing to the lack of availability. Thus the present study sought to assess the variation in salivary pH in vivo, following the consumption of different dairy products (cheese, milk, yogurt with paraffin used as control).

## MATERIALS AND METHODS

A sample of 40 healthy subjects (6-12 years old) was randomly selected for this study. All the subjects were caries free, that is, with no decayed, missing, or filled teeth (DMFT). Eligible participants were given an informational summary to read with their parents, and the study was also explained verbally. Subjects with missing teeth were excluded from this study, as were those undergoing orthodontic treatment, antibiotic therapy or other chemotherapeutic procedures with a potential effect on salivary secretion. Subjects with caries, history to food allergies especially to dairy products and were unwilling to participate were also excluded. All appointments took place in the morning. Oral prophylaxis had been done in all the children. Each subject was then assigned randomly to one of four groups:

Group I:- Sugar free milk (n = 10),

Group II:- Sugar free yogurt (n = 10),

Group III:- Processed cheese (n = 10),

Group IV:- Control (paraffin) (n = 10).

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After the baseline estimation of salivary pH, the subjects in each groups were allowed to consume their respective products: cheese(10 g), milk (15 ml),sugarless yogurt (10 g), or paraffin (5 g) for 3 minutes. They were then asked to swish their mouths with deionized water. The pH was measured after intervals of 10, 20, and 30 minutes, with the help of digital pH meter on all subjects. This aspect of time has been shown to be adequate for significant buffering of salivary pH.

During the entire study, salivary pH was assessed directly using a pH electrode (Sigma Instruments, Inc.) connected to a display unit. This miniature wire electrode was designed to measure the fast pH changes in small samples. Initially, the tips of new and sterilized electrode pH sensors were soaked in distilled water for several hours prior to use. Once prepared, the electrodes were stored in a reference buffer (pH = 7), where calibrations were performed before assessment of each subject. Saliva was collected in test tube and salivary pH was assessed.

The electrode was rinsed in distilled deionized water between each reading to protect against cross-contamination. Difference in mean salivary pH values between the groups and at different time intervals were statistically analyzed using one-way ANOVA.

## RESULT

Groups	Baseline pH	pH at 10 min	pH at 20 min	pH at 30 min
Group I (Milk)	6.90±0.45	6.70±0.35	6.69±0.43	6.56±0.45
Group II (Yogurt)	6.59±1.03	6.47±0.90	6.34±0.88	6.34±0.83
Group III (Cheese)	7.04±0.28	7.27±0.14	7.27±0.21	7.21±0.19
Group IV (Control)	6.93±0.26	6.99±0.31	6.91±0.27	6.89±0.24
Annova	1.022	4.514	5.570	5.762
P value <0.05 = Significant	0.394	0.009	0.003	0.003

### One way ANNOVA

Table above summarizes data recorded for the 4 groups analyzed at baseline, 10, 20, and 30 minutes. The results showed a statistically significant difference in mean salivary pH between baseline, 10 minutes, 20 minutes and 30 minutes. Following the consumption of dairy products, it was found that the mean salivary pH in the cheese group rose rapidly after 10 minutes 20 and 30 minutes compared to baseline values. However, the salivary pH at 20 minutes was highest than baseline, 10 and 30 minutes. These variations were found to be statistically significant ( $P < 0.003$ ). Among those who drank milk, salivary pH decreased after 10, 20 and 30 minutes; however, the variations at the different time intervals were also found to be significant. Among the subjects who consumed yogurt, salivary pH dropped rapidly after 10, 20 and 30 minutes. In this case, the variations at different time intervals were found to be significant. Results showed significant differences in the yogurt group between, baseline and 10, 20 and 30 minutes.

## DISCUSSION

Various studies have demonstrated that Dairy products have low cariogenic potential and demonstrate anticaries activity, although additional investigations are required.<sup>3,4,5</sup>

One approach to estimate the acidogenic potential of food involves evaluation of the magnitude of the pH response following ingestion of food.

Although salivary pH is not the only criteria or parameter that predispose to dental caries, it is an effective tool at the chair side and in school health education programs to educate smaller and larger groups on the nutritional and protective aspects of food as part of diet counselling.

Prior to consumption of test foods resting salivary pH was recorded to provide baseline values against which their rise and drop in pH could be evaluated. The baseline values thus, measured were in the range of 6.5 to 7.4 and are similar to earlier reports.<sup>1</sup> The results tend to confirm previous reports of salivary testing showing a subject-to-subject variation in response to test foods as individuals in a population differ considerably in salivary pH due to variation in caries susceptibility.

The results of the present study revealed that the cheese consumption led to an increase in salivary pH at various time intervals, but cheese showed a greater increase in salivary pH even at 30 minutes, while the salivary pH of milk and yogurt decreased at 10 and 20 minutes, 30 minutes compared to baseline level, the salivary pH in the milk group was decrease to that of the base line pH, while in the yogurt group, it was lowered more.

pH values after cheese consumption seems to be the reduction of critical salivary pH. The anti-cariogenic properties of cheese can be This reduction occurred due to diffusion of calcium and phosphorus into the saliva from the cheese; the buffering of the salivary pH by, which was stimulated by chewing cheese (a strong sialagogue); the fact that cheese contains a significant amount of tyramine, which could be used by microorganisms to raise the pH value of saliva; and the accelerated rise in pH (similar to a plaque pH rise) due to the peptides in the cheese.<sup>6,7,8</sup>

Milk fermentation leads to the production of lactic acid and the resulting pH decrease inhibits growth of many pathogenic organisms. The reduction in the milk group may be due to direct chemical effect of Casein, Phosphopeptides, Calcium and Phosphate.<sup>4</sup> One of the most popular fermented foods is yogurt, which traditionally has been fermented with *L.bulgaricus*. Yogurt consumption in this study led to a rapid drop in

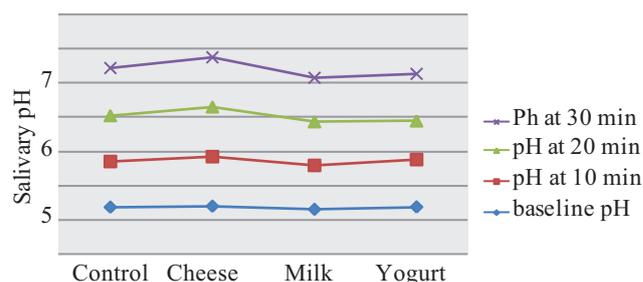


Figure-1: Salivary pH

the salivary pH; however, the decrease did not drive it below the critical pH of 5.5 at 10 minutes, similar to the results of previous studies. The initial fall in salivary pH was due to the acidic nature of the yogurt (4.0-4.5 pH).<sup>1,9,10</sup>

## CONCLUSION

Among the three dairy products consumed cheese showed the highest salivary pH 30 minutes after consumption, followed by milk and yogurt. These suggest that cheese has the highest anti cariogenic property among these dairy products. The pH levels of milk and yogurt grouped approached baseline or neutrality. None of the milk products in this study lowered the salivary pH below the critical pH of 5.5, where enamel demineralization and dissolution are expected even at 10 minutes interval. These findings confirm that these dairy products without sugar are noncariogenic and to some extent cariostatic. Hence it can be concluded that dairy products without added sugar can be used as substitute for carbohydrate laden desserts and snacks, which may help reduce the incidence of dental caries.

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# Clinical Applications of Precision Attachments: A Review

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## ABSTRACT

Today's practitioners are faced with challenging tasks due to a better understanding of the oral environment. This makes it very important for the practitioner to reconcile what is actually feasible considering the patient's own expectations. Precision attachments evolved as a connecting link between the fixed and removable type of partial dentures. They retain and attach a removable bridge or partial denture on natural teeth, vital and non-vital. Some serve as retainers for complete dentures (overdentures) where few abutments remain. The main purpose of each precision attachment, besides retention, is its concealment within or under a restoration as an esthetically better alternative to a visible clasp retainer. This article reviews other such clinical applications of precision attachments.

**Keywords:** attachment-retained overdenture, bar attachment, stud attachment

## INTRODUCTION

Modern day technological advancements like the internet have provided patients with the power of knowledge of the oral environment together with the fact that their restorations be esthetically pleasing, functional and comfortable. The desire to balance between functional stability and cosmetic appeal in partial dentures gave rise to the development of precision attachments.

From their first introduction to the dental profession, precision attachments have been surrounded by an aura of mystery, implying that greater skill is required in their use. This has served as a contributing factor in discouraging their general use. From a patient's view point, no other appliance offers more comfort, security and esthetics than the precision attachment offers<sup>1</sup>.

## HISTORY

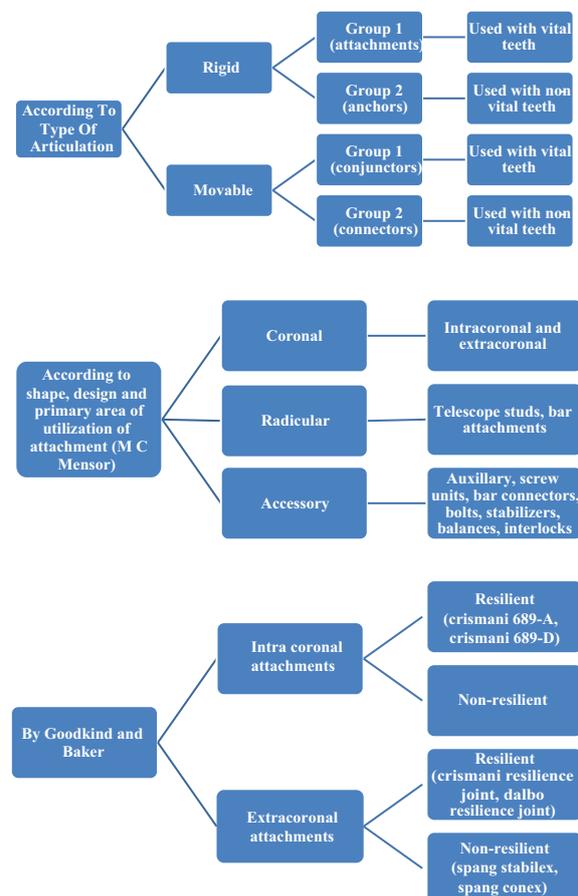
Development of intracoronal and extracoronal attachments has been traced from antiquity to modern times. Prior to manufacturing of intracoronal attachment, early attachments were being bent, cut and soldered into shape by their inventors such as Evans, Peeso, Roach, Morgan and Chayes. Materials employed were Gold, Platinum and Iridoplatinum. Some of these early attachments were named the split bar attachment, tube and split cast attachment, solid post attachment, winged lug attachment and tube attachment.

Without doubt, the most important personality in the development of precision attachment dentistry was Dr. Herman. E. S. Chayes. He is called the father of precision intracoronal retainer.

In Europe, particularly Switzerland, known as the "country of watch makers and fine mechanics", development in the field of attachments picked momentum before, during and

after the Second World War.

## CLASSIFICATIONS<sup>2-4</sup>



## INDICATIONS<sup>5</sup>

1. Movable joints in fixed-movable bridge work
2. As stress breakers in free-end saddles and bridges
3. Intracoronal attachments are effective retainers for removable partial dentures

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4. As connectors for sectional dentures
5. Sections of a fixed prosthesis may be connected with intra coronal attachments
6. To lock a connector joining a saddle on the opposite side of the arch
7. As contingency devices for the extension or conversion of existing fixed appliances
8. Periodontal involvement that contraindicates fixed partial dentures
9. Labial clasp arms which would otherwise be displayed in the anterior part of the mouth and would be esthetically not acceptable
10. To retain hybrid dentures

**CONTRA-INDICATIONS<sup>5</sup>**

1. Sick and the senile (prosthesis with attachments must be inserted along one precise path of insertion, the patient must possess an average degree of manual skill).
2. Periodontosis
3. Abnormally high caries rate
4. Inadequate space to employ them (teeth that are very narrow facio-lingually).
5. Poor neuromuscular coordination and in neuromuscular disorders

**ADVANTAGES<sup>5</sup>**

Frictional wall precision attachment partial dentures direct the forces on the abutment with the long axis of the tooth. The fulcra are reduced in height, closer to the crestal bone level.

This improves the longevity of the abutment teeth and increases patient satisfaction.

**DISADVANTAGES<sup>5</sup>**

1. Abutment teeth have to be restored
2. Economics

**MECHANISM OF ACTION<sup>6</sup>**

Retainers must hold the prosthesis securely in place during chewing, swallowing, speaking and other oral functions. Therefore, male and female portions must fit together precisely.

Resistance to separation within the attachment is by following mechanisms.

- 1) Friction: Occurs when parallel walls of closely fitting bodies pass over one another. Friction occurs between contacting parallel walled bodies. The frictional force is directly related to the area of the opposing surfaces as well as to the length of axial walls.
- 2) Binding – Occurs when a parallel walled body tips within its receptor site.
- 3) Wedging of conical bodies- Friction comes into play only in the terminal position and is lost as soon as the bodies begin to separate.

- 4) Internal spring loading-The friction within retainers is often increased by loading with internal spring clips. Slots in the male portion allow the pressure to be adjusted.
- 5) Active Retention- That is when one body must be temporarily deformed to be withdrawn from its fully seated position. Active retention means a physical obstruction to separation of other parts. One part must undergo elastic deformation before separation can occur.

**ATTACHMENT SELECTION<sup>7</sup>**

In 1971, 126 attachments were listed and classified by Dr. Merrill Mensor, this is called as E. M. attachment selector. (fig 1)

It has 5 charts giving specification as to type, vertical dimension (Minimal and Maximal), whether it is for anterior and posterior teeth, whether the assembly is simple or complex, whether the function is rigid or resilient, type of resilience, size of movement and type of retention. It shows if the attachment is interchangeable or replaceable and finally what type of alloy and material it is made of.

E.M. attachment selector system utilizes a colour coded millimeter attachment gauge to define the vertical clearance available in the edentulous regions of occluded casts for attachment selection. The gauge is made of plastic and measuring 75 mm in length. It is graduated from 3 to 8 mm in 1 mm increments with a corresponding colour code. Red designates 3 to 4 mm, yellow designates 5 to 6 mm and black designates 7 to 8 mm. The gauge is placed between the occluded casts adjacent to a tooth that will carry an attachment. The measurement is thus read numerically and according to colour.

In selecting an attachment system;

- i. The first decision that must be made is whether to use an intracoronal or an extracoronal attachment,
- ii. The second decision to be made is whether to use a resilient or a nonresilient type,
- iii. The third consideration is that the largest attachment can be used within the given available space should be chosen to gain maximum stability, retention and strength for the prosthesis.

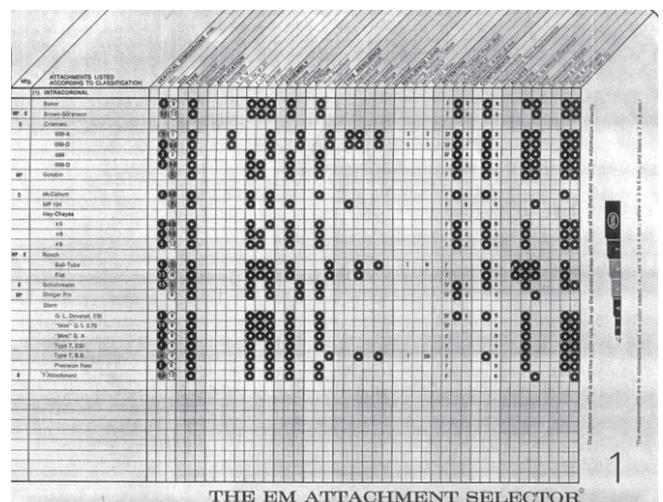


Figure-1: EM attachment selector

## CLINICAL APPLICATIONS OF PRECISION ATTACHMENTS

Precision attachments can be used in various situations for rehabilitation. Some of these are outlined below.

### 1. Precision attachment-retained overdentures

The attachment-fixation overdenture is far superior to other types of overdentures or other forms of overlay prostheses<sup>8</sup>. It can more closely approximate the results obtained with fixed bridgework and precision partial denture prosthetics than is possible with conventional complete dentures. The patient is more secure in its use. Thus, he enjoys increased comfort, function, and a more natural appearance.

Whether an extra-coronal or intra-coronal attachment is to be utilized, the dentist must make his selection based upon his knowledge of such factors as crown-root ratio, type of copings, vertical space available, number of teeth present, amount of bone support, location of abutments, and whether the overdenture is to be a tooth-supported or tooth-tissue-supported. These attachments can also be used with implants.

Examples of precision attachments for overdentures are:

#### A. Bar attachments

- Dolder bar
- Hader bar (fig 2)
- Andrews bar
- Ceka bar
- Octalink
- C.M. bar
- M. P. Channels
- Ackerman bar
- Customized bars

#### B. Stud attachments

- Dalla Bona
- Gerber
- Ceka
- Rothermann
- Gmur
- Huser
- Schubiger
- Ancrofix

#### C. Auxiliary attachments

- Schubiger screw system
- VK screw system
- Ipsoclip
- Pressomatic
- IC attachment

### 2. Precision attachments for removable partial dentures

#### A. Extracoronal attachments<sup>9-20</sup>

- Spang stabilex and conex
- Crismani resilience joint
- Dalla bona resilience joint (fig 3)
- Steiger axial rotation joint

- Scott External precision attachment
- Hinges

#### B. Intracoronal attachments<sup>21-24</sup>

- Ceka attachment
- Telescope Studs (Push Button Attachments)
- Gerber retention cylinder
- Dalla bona cylindrical anchor
- Schneider anchor
- Baer fah anchor
- Rothermann eccentric

#### 3. Precision attachments in fixed prosthodontics<sup>25-28</sup>

Precision Attachments are also used in fixed prosthodontics. They are employed to reduce the size of a splint for ease of parallelism and for ease of cementation. Rationales for employment are as follows:

1. Precision attachments facilitate parallelism of small sections rather than requiring attempts to parallel up to 14 teeth.
2. Usually the lower anterior teeth are flared; thus it is impossible to obtain a path of insertion between the lower anterior teeth and the second molar for a one piece splint that will have a common path of insertion, unless a number of teeth are devitalized.
3. When using porcelain fused to metal, the more units the dentist places on the splint, the more contraction occurs when the technician bakes the porcelain, and the poorer the fit.
4. When the cementing medium washes out, it is usually the second molar that washes out first. The dentist can



Figure-2: the Hader bar

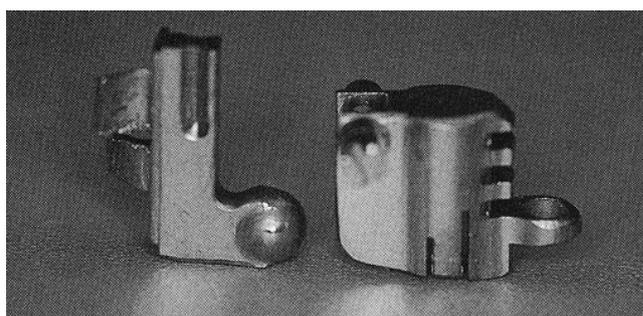


Figure-3: Dalla bona attachment

then replace a small section instead of remaking a complete dental arch. The rest seat is placed in the strongest section, which usually is the anterior section, with the rest in the posterior. The rest and rest seat should be at the desired occlusal height, and no porcelain should be placed occlusally over the attachment. If porcelain is placed occlusally over the attachment, it will fracture.

## INSTRUCTIONS TO PATIENT AND RECALL<sup>29</sup>

### Instructions to the patient

Before the patient is dismissed, the difficulties that may be encountered and the care that must be given to the prosthesis and the abutment teeth must be reviewed.

### Return For Post insertion Adjustments

The patient should be scheduled for the first post insertion appointment 24 hours following insertion of the denture. The patient is instructed to wear the denture continuously between the first two appointments except for cleaning. After 24 hours, the patient will have some opinions regarding how the denture feels and how they function. Scheduled appointments for postinsertion adjustments will indicate to patients that there is concern for their well being and that minor adjustments will be necessary to improve the fit and comfort of the denture.

### Sore spots

The patient should be informed that sore spots may develop and that appointments are being scheduled to detect and eliminate them at the earliest opportunity. The patient should be informed that after the initial period of adjustment additional sore spots may develop from time to time, and those that persist for several days should be examined and adjusted.

### Insertion and removal

The patient should be visually introduced to the removal and placement of removable partial denture. The patient is brought in front of a mirror and asked to insert and remove the partial denture in the correct fashion several times before being dismissed.

### When To Wear The Partial Denture

It is better to leave the removable partial denture out of the mouth during sleeping hours to allow the adjacent tissues a chance to rest and recuperate. When the prosthesis is out of the mouth it should be immersed in water to prevent dehydration of the acrylic resin. When the removable partial denture is not being worn, the patient should refrain from eating, since food can become impacted within the female receptacle.

### Cleaning The Denture

Patients who wear removable partial denture prostheses should be encouraged to maintain meticulous oral hygiene. The teeth adjacent to the removable partial denture are especially susceptible to decay, since they no longer receive

the same kind of thorough cleansing action from the cheeks, tongue and saliva. Food that accumulates between the prosthesis and the teeth must be removed after meals to prevent the potential for carious involvement. The removable partial denture should be rinsed under cool water after each meal and brushed at bedtime with a natural bristle brush along with the regular tooth brushing routine. Special partial denture brushes for cleaning inside portions of clasps and adjacent to attachments can be purchased at most pharmacies. Smokers tars that build up on the framework can be removed by immersing the denture overnight in white vinegar. More persistent stains and calculus buildup should be removed at the patient's routine recall appointment. An ultrasonic cleaner with the proper solution for stains and calculus will remove stubborn unsightly deposits.

### Speech

The patient may experience some difficulty in speaking clearly at first, particularly if the maxillary removable partial denture covers all or part of the palate or anterior teeth are being replaced. The tongue may be somewhat restricted and needs time to adjust to the new environment. The condition is usually temporary and will improve rapidly, almost without conscious effort on the part of the patient. The patient who has greater difficulty can speed up the speaking process by reading aloud and repeating those sounds that are most troublesome.

### Saliva

The patient may notice an excess of saliva in the first few days of wearing the partial denture. As the removable partial denture becomes a permanent part of the oral environment, the flow of saliva should decrease.

### Tooth soreness or sensitivity

Teeth that have become abutments for the removable partial denture have often been out of function prior to placement of the prosthesis. Teeth that are put back into function may become sore as a result of loading and the minor orthodontic effects of the removable partial denture. The patient should be advised of this possibility. A premature occlusal contact may also be the cause. Remount procedures and occlusal adjustment are recommended at the time of insertion and subsequently with or without the symptoms of tooth soreness.

## CONCLUSION

A dental surgeon must combine his skills of prosthodontics, periodontics and conservative dentistry if he has to restore a dentition effectively after it has been damaged by disease, trauma or wear. He must be capable of making an accurate diagnosis, taking into account all pertinent information. This will include condition of remaining teeth, their supporting structures, the surrounding soft and hard tissues, the occlusal relationship of teeth and articulation of jaws. This information must be considered against emotional and social circumstances of the patient before satisfactory treatment plan is evolved. All these factors play a very important role in

replacement of missing teeth by prosthesis that include precision attachments.

Unfortunately, most often precision attachments are chosen from descriptions in commercial catalogues. A dentist must base his techniques on both sound biological principles and mechanical considerations.

Then precision attachments becomes what it should be, a beautiful example of bio-engineering that will be compatible with the continuing health of masticatory apparatus.

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**ABSTRACT**

1.

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# Awareness and Knowledge of Risk in Radiation Exposure among Health Care Professionals: A Hospital Based Survey

Apurva Vohra<sup>1</sup>

## ABSTRACT

**Introduction:** The pioneers of radiology were exposed to high doses of radiation, leading to various dermatoses, hematological disorders, cataract or cancer diseases. The present study was conducted to assess the level of knowledge of radiation hazards among health care providers and professionals who are exposed to radiations during diagnostic and treatment procedures.

**Materials and methods:** The study consisted of a questionnaire survey evaluating knowledge, awareness and concern regarding radiological exposure among 40 health care providers and professionals i.e. nurses, doctors, medical technicians, assistant and other staff.

**Result:** 90% of study subjects reported that radiological diagnostic examinations can increase the risk of cancer development in patients in future, 2% was not agree with this statement and 8% subjects does not answer this question. 45% of subjects wear lead aprons, 15% shields as radiation protection measure and 10% maintain distance from source of radiation exposure and 15% subjects were not taking any protection measure. 70% study subjects never explained the possible risks of radiation to patients, 6% some time, 5% most of the time and 5% always explained.

**Conclusion:** There is a need to disseminate information regarding radiation dose and the possible risks to the non-radiology medical community. Staff should receive education, and the diagnostic imaging request process may need to include information on radiation doses and risks.

**Keywords:** Radiation exposure; Healthcare professionals; Awareness

## INTRODUCTION

The term radiation includes a wide spectrum of different forms of energy,<sup>1</sup> which has been a boon for medical care as by generating detailed anatomical pictures, the technology can improve diagnoses, limit unneeded medical procedures and can thus, enhance treatment.<sup>2</sup> However radiation exposure has also been suspected to cause ill health to human-beings.<sup>1</sup> As the imaging modalities deploy ionizing radiation, hence as a consequence, the exposure of interventional radiologists and other working staff in the radiology department to radiation has increased as medical imaging has expanded. In the United Kingdom an estimated 100-250 deaths occur each year from cancers directly related to medical exposure to radiation. In March 2000, the UK secretary of state issued new regulations that emphasized the importance and dangers of radiation.<sup>3</sup> Thus, due to potential harmful effects, it is the duty of a health care professionals to provide actual and basic knowledge to the patients undergoing all radiological procedures and processes.<sup>4</sup> The physician should

answer to queries of patient regarding radiation hazards, which can be reliable provided their knowledge is adequate and up-to-date. The knowledge related to radiation is taught during undergraduate training in medical colleges. However, physicians grossly underestimate the proper risk regarding proper use of medical imaging tools and their associated radiation risks.<sup>3,5</sup>

The largest group of individuals exposed occupationally to artificial radiation sources is that employed in health facilities. These individuals include: radiologists; radiation oncologists; other physicians who use X rays and radionuclides in their practices; other practitioners, such as dentists, pediatricians and chiropractors, who are licensed to use X rays; radiographers and radiological technologists who assist in the production of images and the management of patients; radiological physicists; installers; repairmen; and inspectors and regulators.<sup>6</sup> In view of this, the present study was conducted to assess the level of knowledge of radiation hazards among health care professionals who are exposed to radiations during diagnostic and treatment procedures.

## MATERIAL AND METHODS

The present study is a questionnaire based cross-sectional study conducted on 40 health care professionals in 2 major hospitals of the city. The method of sampling was convenience sampling. An informed consent was obtained and ethical clearance was taken from the ethical committee. The study was conducted from July and September 2015. The questionnaire survey consisting of closed-ended questions (table 1) regarding the profession and the knowledge of the basic principles of radiation protection in diagnostics and treatment carried out using radiation. Data was obtained regarding the clinical experience, position, frequency of contact with radiations. The obtained results were subjected to analysis using the appropriate statistical analysis.

## RESULT

The results of present study (table 1) found that among the

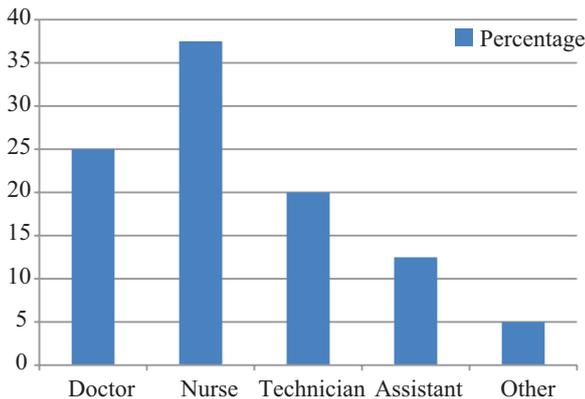
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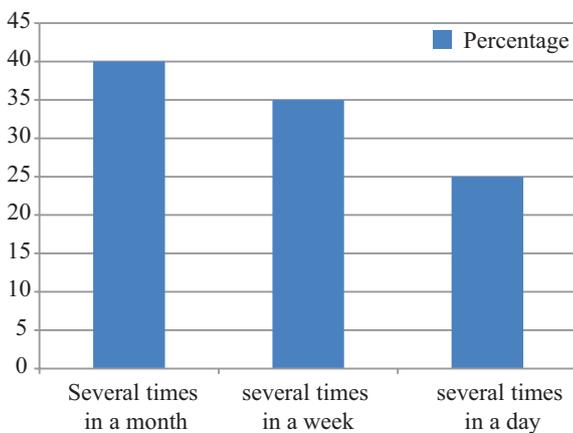
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health providers and professionals who were being exposed to radiation, 25% were doctors, 37.5% were nurses, 20% were technicians and 2% other (attendants, helpers, sweepers) (graph 1). Among 40 subjects included in the study 12.5% were working in radiological department since less than 1 year, 37.5% were working for a period between 1-5 years, 40% for 6-10 years, 5% for 11-15 years and 5% were working from more than 16 years (graph 2).

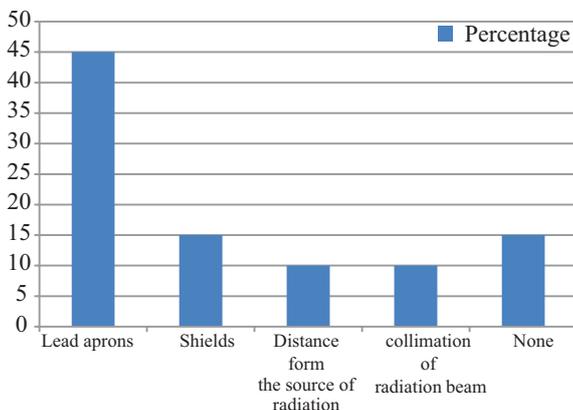
The present study reported that among the subjects 40% assist or carry out radiological procedures several times in a month, 35% several times in a week and 25% several times



**Graph-1:** Position of Health care providers and professionals included in study.



**Graph-2:** Frequency of radiological examinations of patients by Health care providers and professionals

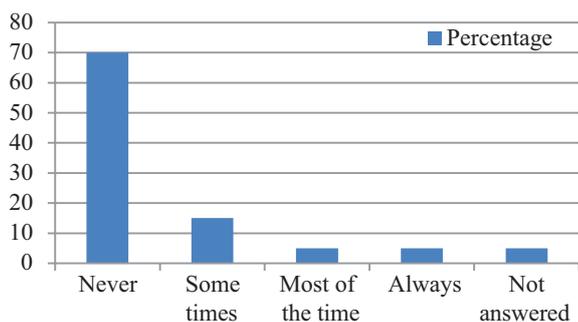


**Graph-3:** Radiation protection measures used by study group

in a day, thus exposing themselves to radiation during radiological examination (graph 3). 90% of study subjects reported that radiological diagnostic examinations can increase the risk of cancer development in patients in future, 2% was not agree with this statement and 8% subjects does not answer this question. 45% of subjects wear lead aprons, 15% shields

Question	No. and Percentage	
	Response	Percentage
1 What is your Position as health care professional?	Doctor	10 (25%)
	Nurse	15 (37.5%)
	Technician	8 (20%)
	Assistant	5 (12.5%)
	Other	2 (5%)
2 Duration of work in radiological department?	less than 1 year	5 (12.5%)
	1-5 years	15 (37.5%)
	6-10 years	16 (40%)
	11-15 years	2 (5%)
	more than 16 years	2 (5%)
3 How many times you assist or carry out radiological examinations of patients?	several times a month	16 (40%)
	several times a week	14 (35%)
	several times a day	10 (25%)
4 Do you think that radiological diagnostic examinations can increase the risk of cancer development in patients in future?	yes	36 (90%)
	no	1 (2.5%)
	Not answered	3 (7.5%)
5 Which radiation protection measures you are aware of?	none	8 (15%)
	lead apron	18 (45%)
	shields	6 (15%)
	distance from the source of radiation	4 (10%)
	time of exposure	4 (10%)
6 Attitude regarding the statement that patients referred for radiological investigations involving ionizing radiation should be informed of the possible risks?	Strongly disagree	4 (10.5%)
	Disagree	5 (12.5%)
	Unsure	15 (37.5%)
	Agree	6 (15%)
	Strongly agree	10 (25%)
	Not answered	-
7 Do you explaining possible risks of radiation to patients?	Never	28 (70%)
	Sometimes	6 (15%)
	Most of the time	2 (5%)
	Always	2 (5%)
	Not answered	2 (5%)

**Table-1:** Questionnaire and response of health care professionals.



**Graph-4:** Health care providers and professionals explaining possible risks of radiation to patients

as radiation protection measure and 10% maintain distance from source of radiation exposure and 15% subjects were not taking any protection measure. 70% study subjects never explained the possible risks of radiation to patients, 6% some time, 5% most of the time and 5% always explained.

## DISCUSSION

Everyone alive in this world is being exposed to ionizing radiations and about 18% exposure is due to man-made source. There is likely to be a risk in investigations that involves ionizing radiation to patient's health as the US National Council on Radiation Protection and Measurements had reported that medical X-rays and nuclear medicine accounts for only 15% of all exposures to radiation.<sup>1</sup>

Our study found that subjects working in the radiology department lack proper knowledge of radiation exposure from medical imaging. The safety of patients and staff is a priority of every diagnostic or therapeutic procedure involving ionizing radiation. Radiation exposure should always operate under the As Low As Reasonably Achievable (ALARA) principle and as opportunities do exist in the radiation field for collective dose reduction, both by reducing the numbers of scans and by reducing the doses per scan.<sup>7</sup> ALARA denotes making every reasonable effort to keep patient exposures to ionising radiation as far below dose limits as practical, while maintaining diagnostic yield.<sup>8</sup>

90% of study subjects were aware that radiological diagnostic examinations can increase the risk of cancer development in persons exposed to radiations. However, data regarding radiation protection found that 45% of subjects wear lead aprons, 15% shields as radiation protection measure and 10% maintain distance from source of radiation exposure and 15% subjects were not taking any protection measure. Thus, the present study found that health care professionals underestimate radiation exposure of frequently used diagnostic imaging and the associated risks.

Study group in the present study comprised of doctors posted in the radiology department along with non-physicians (i.e. nurses, medical technicians and auxiliary staff members as due to the frequent contact of these medical professionals with patients before and during procedures involving ionizing radiation. Similarly, Szarmach A et al<sup>5</sup> conducted a survey among the medical staff and concluded that education in the field of radiological protection should be a subject of

periodic training of medical personnel regardless of position and length of service. Kew TY et al<sup>8</sup> assessed knowledge regarding medical radiation exposure and its associated risks among non-radiology doctors and reported that there was a lack of awareness of radiation doses and risk of carcinogenesis and there is a need to disseminate information regarding radiation dose and the possible risks to the nonradiology-medical community. Keijzers GB et al<sup>9</sup> assessed emergency department doctors knowledge of radiation doses associated with diagnostic procedures and reported that over three-quarters of doctors underestimated the lifetime risk of fatal cancer attributable to a single computed tomography scan of the abdomen and most doctors reported never attended any formal training on risks to patients from radiation exposure.

A study conducted on medical students by Mubeen SM et al<sup>1</sup> showed nearly 40% of the students accepted that objects in the X-ray room emit radiation after an X-ray procedure and nearly the same percentage agreed that protective measures should be taken while performing an ultrasound and that dangerous radiation is emitted from good quality microwave equipment. Slightly more than one-third students viewed that gamma rays are more hazardous than X-rays while the same percentage agreed that intravenous contrast material used in angiogram is radioactive. Sixty-seven percent students agreed that nuclear material used in medicine is potentially explosive while 18% of students were in the opinion that MRI emits ionizing radiation.

70% study subjects never explained the possible risks of radiation to patients, 6% some time, 5% most of the time and 5% always explained. Patient safety is a priority in any medical investigation or intervention. There are a number of measures that radiation personnel may utilise to reduce cumulative radiation risks to patients. These include technical aspects (automated tube current modulation, beam filtration, adaptive collimation), imaging parameter selection (decreasing tube potential and current), and protocol modifications (multiple pass scanning and reduction of duplicate coverage).<sup>8</sup> It is important that doctors who request imaging are well trained in deciding whether diagnostic imaging is indicated, but also have an accurate knowledge of the associated risks. This is particularly important in the emergency department, where many radiological imaging tests are requested each day, often in a time-pressured environment.<sup>9</sup>

## CONCLUSION

It is well known to both the lay public and to medical professionals that although radiological investigations are valuable, they represent a small but definite potential risk to health through exposure to ionising radiation. There is a lack of awareness of radiation doses and risk of carcinogenesis, among patients and health care professional. Thus, there is a need to disseminate information regarding radiation dose and the possible risks to the non-radiology medical community. Staff should receive education, and the diagnostic imaging request process may need to include information on radiation doses and risks. It is important that medical personnel working in radiology, nuclear medicine and radiation on-

cology that may contain radiation exposure should use ring badges, whole body film badges and/or TLD badges to avoid excessive radiation dose.

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# Radiological Monitoring Equipments at Medical Workplace

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## ABSTRACT

The use of radiology for diagnostic and therapeutic purposes is so well established that it is difficult to imagine contemporary medical profession without it. However, the nature, frequency and accuracy of individual monitoring must be determined with deliberation of the magnitude and possible fluctuations of radiation exposure levels and the likelihood and magnitude of potential exposures. Different types measuring devices are available commercially for personal and work place monitoring. The article aims to discuss various available monitoring devices as it is important to utilise these at medical workplaces so that absorbed dose to tissues of occupationally exposed individuals can be assessed and thus can report and investigate over exposures and recommend necessary remedial measures urgently.

**Keywords:** Film badges; Thermo luminescent dosimeters

## INTRODUCTION

The Federal Radiation Protection Code requires that a monitoring device be worn or carried by an occupationally exposed individual for the purpose of measuring the radiation exposure received.<sup>1</sup> The nature, frequency and accuracy of individual monitoring shall be determined with consideration of the magnitude and possible fluctuations of exposure levels and the likelihood and magnitude of potential exposures.

The personnel monitoring is crucial to observe and control individual doses regularly in order to ensure compliance with the stipulated dose limits and thus can report and investigate over exposures and recommend necessary remedial measures urgently. Personnel monitoring aims to maintain life time cumulative dose records of the users of the service. Hence, the radiation received by all the radiation workers during their work should be regularly monitored and a complete up to date record of these doses should be maintained.<sup>2</sup> Monitoring of radiation exposure is required for healthcare or laboratory workers in non-emergency environments (radiology, nuclear medicine and radiation oncology) that may contain radiation, workers in emergency environments that may contain radiation and workers in industrial environments where radiation is used i.e. nuclear power plant workers or employees at radiation sterilizing facilities.<sup>3</sup> Medical radiation exposures are intended to provide direct benefit to the patient. When the exposure is justified and the use optimized, the dose is considered to be as low as is compatible with the medical purposes.<sup>4</sup>

The dose is the sum of the body dosimeter deep dose plus internal effective dose equivalent from ingested or inhaled radionuclides. Dose limits for adult workers, minor workers, declared pregnant women, and members of the public issued

according to Environmental Health and Safety, Stanford University, Stanford California<sup>5</sup> is described in table 1.

Personnel monitoring is usually done by employing Film badges, Thermo luminescent dosimeters (TLD) or optically stimulated luminance dosimeter (OSL), and pocket dosimeter.<sup>2</sup>

Thermoluminescent dosimeters (TLDs) and films badges are wearable devices that measure ionizing radiation exposure levels. These instruments are often worn by personnel near the torso as this represents the primary location of body mass and organs, but they may also be attached to objects. These devices typically remain in place for extended intervals to assess cumulative exposure. They are considered 'delayed read' dosimeters as the instruments must be processed post-exposure to obtain dosage measurements.<sup>6</sup>

## TLD AND FILM BADGES

### Film Badge

The film badge dosimeter is a personal dosimeter used for monitoring cumulative radiation dose due to ionizing radiation. It is a film wrapped in light-tight paper and is mounted in plastic. Badges are checked periodically, and the degree of exposure of the film indicates the cumulative amount of radiation to which the wearer has been exposed.<sup>7</sup>

Flat badges are usually worn on the torso, at the collar or chest level, but can be worn on the belt, or forearm. Ring shaped badges can be worn on the finger when dose to the finger may exceed dose to the badge worn elsewhere on the body Radiation Detection Devices.<sup>8</sup>

### Thermoluminescent Dosimeter (TLD)

Thermoluminescent dosimeters (TLDs) are crystalline solids that trap electrons when exposed to ionizing radiation and can be calibrated to give a reading of radiation level. Film badges are most often worn by hospital staff potentially exposed to x-rays or researchers working with higher energy beta emitters. TLDs are most often worn by persons exposed to a variety of isotopes such as found in nuclear medicine or the cyclotron facility. All dosimeters are processed by a contractor. They are collected the first week of every wear period. Most monitors can read as low as 10 millirem.<sup>7</sup> Limitation of TLD is delay between exposure and dose reading due to central processing of TLDs.<sup>7</sup>

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Some crystals, such as LiF, store ionizing radiation energy when valence electrons are moved to higher energy “traps” within the crystal matrix. The trapped electrons are released by heating the crystal. When they return to the lower valence energy level, the difference in energy is released as visible light. The amount of visible light released is proportional to the radiation dose absorbed by the crystal. The process is called thermoluminescent dosimetry.<sup>5</sup>

**Pocket Dosimeters**

Film and TLD will not show accumulated exposure immediately. In addition to the regular film badges, the radiation doses received by the radiation worker can be assessed by wearing a pocket dosimeter, which gives instantaneous radiation exposure. This is very useful in non-routine work, in which the radiation levels vary considerably and may be quite hazardous. The main advantage of pocket dosimeter lies in its ability to provide instant on the spot check of radiation dose received by the personnel. Suitable protective measures can be undertaken immediately to minimize future exposures. The dose can be read off directly by the person during or after any radiation work.<sup>2</sup>

**Digital Electronic Dosimeter**

Another type of pocket dosimeter is the Digital Electronic Dosimeter. These dosimeters record dose information and dose rate. These dosimeters most often use Geiger-Muller counters. The output of the radiation detector is collected and, when a predetermined exposure has been reached, the collected charge is discharged to trigger an electronic counter. The counter then displays the accumulated exposure and dose rate in digital form. Some Digital Electronic Dosimeters include an audible alarm feature which emits an audible signal or chirp with each recorded increment of exposure. Some models can also be set to provide a continuous audible signal when a preset exposure has been reached. This format helps to minimize the reading errors associated with direct reading pocket ionization chamber dosimeters and allows the instrument to achieve a higher maximum readout before resetting is necessary.<sup>9</sup>

Environmental monitoring program focus on estimating radiation doses that are or could be received by population or unspecified individuals as a result of natural or manmade radiation condition. Facility or work place monitoring provide information about conditions within buildings and in the vicinity of processes presenting radiological hazards.<sup>10</sup>

**Ionization Chambers**

An ionization chamber is a device which measures the amount of ionization created by charged particles passing through a volume of gas enclosed in a vessel. If an electric field be maintained in a gas by a pair of electrodes, the positive and negative ions will drift apart inducing charges on the electrodes. In their traversal the ions may undergo recombination processes, and the charge collected by the electrodes alone will result in the ionization current measured in the external circuit. When every ion is collected, with no loss due

	Whole body dose in one year	Other limits
Adult workers	5 rem	Lens 15 rem each year. Skin, organ, extremities in one year: 50 rem
Minor workers	10% of Adult Limit	10% of Adult Limit
Declared pregnant woman	0.5 rem fetal dose	50 millirem fetal dose each month. Skin, lens, extremities: same as adult worker
Members of the public	0.1 rem	2 mrem in one hour

**Table-1:** Dose limits for adult workers, minor workers, declared pregnant women, and members of the public (According to Environmental Health and Safety, Stanford University, Stanford California).

Group	Type of Detectors	Detection	Use	Characteristics
Gas Filled Detectors	Ionization Chambers	$\alpha, \beta, \gamma$	Radiation Survey	- Accurate Dose Measurements, Slow Response, Non-Pulse Type
	Proportional Counters BF3 & He-3 gases	$\alpha, \beta, n$	$\alpha, \beta$ contamination Survey	Good $\alpha, \beta, n$ discrimination
	Geiger Counters	$\beta, \gamma$	Radiation Survey	Reliable, Inexpensive High Dead Time/saturation
Scintillation Counters	NaI (TI)	$\gamma$	Nuclear Spectroscopy Lab-use and Survey	Higher Efficiency & Lower Energy Resolution. Rapid Response. Expensive.
	ZnS	$\alpha$	Survey	Detect $\alpha$ only
	Liquid Scintillators	Low $\beta$ Energies	Contamination C-14, H-3,....	High Efficiency, Expensive
Semi-Conductor Detectors	Germanium Detectors ( Ge(Li), HPGe) & Si (Li)	X-ray $\gamma$	Nuclear Spectroscopy Lab-use	Higher Energy Resolution & Lower Efficiency. Need N2 Cooling
	Silicon Surface Barrier Detectors	$\alpha$ & Charged Particles	Nuclear Spectroscopy Lab-use	Good Energy Resolution

**Table-2:** Different types of radiation monitors along with type of radiation detector<sup>13</sup>

to recombination, the maximum current is obtained called saturation current which will be proportional to the intensity of radiation.<sup>11</sup>

**Scintillation detectors**

Scintillates are one of the oldest types of radiation detector because measurements could be made with photographic film. Images could be collected or intensity measurements could be made. Measurements were also made with the human eye observing the brightness of frequency of flashes in the scintillator. Nowadays the light output is converted into voltage pulses that are processed in the same way as pulses from proportional counters, semiconductor detectors etc. The whole point of scintillation detectors is that we want to produce a large light output in the visible range.<sup>12</sup>

Different types of radiation monitors along with type of radiation detector are summarised in table 2.

In order to provide an accurate estimate of personal risk, radiation badges are to be used at all times when working with radiation. It is also important to turn in the radiation badges on time. The accuracy of the readings depends on the timely processing of the dosimeter.

The Radiation Safety Officer (RSO) reviews dosimetry records when they are received from the dosimetry vendor. Any exposures exceeding the established ALARA levels

are investigated to determine whether corrective action can eliminate or reduce exposures for all concerned. The circumstances surrounding most cases of excessive radiation exposures are often readily mitigated. Individuals can request their personal records at any time, and written dose estimates will be provided by the RSO.<sup>14</sup>

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## CONCLUSION

It is important that medical personnel working in radiology, nuclear medicine and radiation oncology that may contain radiation exposure should use their ring badges, whole body film badges and/or TLD badges to avoid excessive radiation dose. The selection of the particular type of monitor to be used i.e. ionization chambers, proportional chambers, GM-tubes or scintillation detectors should be determined by the type of radiation, its energy, and whether it is more likely to involve high or low amounts of activity.

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ABSTRACT

1.

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# Psychiatric Morbidity in Hypothyroid Patients

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## ABSTRACT

**Introduction:** The causal relationship between hypothyroid and psychiatric disorders is well established. The high psychiatric morbidity, especially depression (28-50%) and anxiety disorders (30-40%) are prevalent in hypothyroid patients. Aims was to study psychiatric morbidity in Hypothyroid patients.

**Material and Methods:** A total of 100 diagnosed Hypothyroid patients attending Endocrinology clinic of a tertiary care hospital and 100 normal healthy relatives of patients were evaluated before commencement of treatment by Hamilton Rating Scale for Depression, Hamilton Anxiety Scale and the formal psychiatric interview. The clinical diagnosis was made as per International Classification of Diseases. The data were analyzed by Z-test to test the statistical significance.

**Results:** The clinical evaluation revealed that statistically significant number of patients (table-2) suffered from psychiatric diagnostic entity namely Moderate Depressive episode-35 % (40% females and 20% males), Generalized Anxiety disorder-31% (33.33 females and 24% males), sexual disorders -28% (52% males and 20% females) and suicidal ideations- 40% (46.66% females and 20% males).

**Conclusions:** The more females suffered from depression (40% vs 20%), generalized anxiety disorder (33.33% vs 24%) and suicidal ideations (46.66% vs 20%) than males. However, the males suffered more from sexual disorders (52% vs 20%). In conclusion, the females suffered more from psychiatric disorders than males.

**Keywords:** Depression, Anxiety, Sexual disorders, Suicidal Ideations.

## INTRODUCTION

The hypothyroid patients may initially present with major psychiatric features.<sup>1</sup> The hypothyroid patient may be misdiagnosed as primary psychiatric disorder due to its predominant psychiatric manifestations.<sup>2,3</sup> The relation between hypothyroidism and psychiatric manifestations is frequent most of the times. The causal relationship for psychiatric manifestations of hypothyroid is often missed due to its multifarious and intricate clinical presentation.

The psychiatric problems, in a hypothyroid patient which can manifest are depression, organic mental disorders and psychosis mainly manifesting with predominant paranoid features.<sup>4</sup>

The various psychiatric manifestations due to hypothyroid are cognitive disorders (forgetfulness, mental slowness and inattention), emotional lability, depression and various types of hallucinations namely auditory, visual and gustatory.

However, no relationship has been established between degree of hypothyroid state and further development of psychiatric morbidity.<sup>5,3</sup>

The hypothyroid patient can often be misdiagnosed as a psychiatric disorder. Hence, a comprehensive medical evaluation is required to detect features which may help in conformation of hypothyroidism.<sup>4</sup> It is evident from above that hypothyroid can present with any psychiatric disorder. In view of the above, it was considered proper to perform the clinical study of hypothyroid patients to know psychiatric morbidities in hypothyroid patients.

Aims and objectives of the study were to study the psychiatric morbidity in hypothyroid patients and to compare the prevalence of psychiatric morbidity in males and females hypothyroid patients.

## MATERIAL AND METHODS

The approval for ethical clearance from the review board of local institutional ethical committee has already been obtained on 29/07/2015.

The following criteria were used for selection of patients for the study:-

- 1 The patients were not suffering from any other physical illness except hypothyroid.
- 2 The patients did not have any past history of psychiatric disorders.

The study was carried out at the Endocrinology clinic of a large tertiary care hospital. The patients were studied before commencement of treatment. The clinical diagnosis of hypothyroid was made by Endocrinologist and its confirmation by evaluation of TSH, T<sub>3</sub> and T<sub>4</sub> blood levels. The study group constituted every newly diagnosed hypothyroid patients and the control group constituted the 100 healthy relatives of patients (nearly matching with age and sex of hypothyroid patients).

All patients were assessed in a common protocol via a formal psychiatric interview. Psychiatric history and mental status examination were recorded on a specially designed proforma. The International Classification of Diseases (ICD-10) diagnostic criteria were used in making the clinical diagnoses.

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The standardized psychological tests administered to the patient were:-

Hamilton Rating Scale for Depression (HRSD)<sup>6</sup> Hamilton Anxiety scale (HAS).<sup>7</sup>

## STATISTICAL ANALYSIS

The analysis of collected data was carried out using SPSS package and preliminary tables generated were used as baseline data to find out the effect of hypothyroid in causation of psychiatric morbidity. The difference between two proportions (hypothyroid patients sample proportion and control sample proportion) were evaluated by Z-test. The differences were considered significant if the *P* value was < 0.05.

## RESULTS

The demographic characteristics (age and sex, and educational status) of hypothyroid patients are presented in table 1. Mean age of the patients was 39.56 years. The range of age was 21 to 60 years. The details of patients in age group

Age group (in years)	Male (%)	Female (%)	Total percentage
21-30	05(20)	15(20)	20%
31-50	15(60)	45(60)	60%
51-60	05(20)	15(20)	20%
Total	25(100)	75(100)	100%
Education Status			
<10	10(40)	35(46.66)	45%
10-12	10(40)	25(33.33)	35%
Graduation	05(20)	15(20)	20%
Total	25(100)	75(100)	100%

**Table-1:** Demographic Profile of 100 Hypothyroid Patients

wise revealed (20% males and 20% females in 21-30 years age group, 60% males and females in 31-50 years age group, 20% each in males and females in group 51-60 years age). Details of total patients in each group revealed (20% in 21-30 years age group, 60% in 31-50 years age group and 20% in 51-60 years age group).

The sex distribution revealed 25% males and 75% females. Educational status revealed that most of the patients (45%) had studied <10 standard, 35% up to 10-12 standard and 20% were graduate.

**Moderate Depressive Episode:** In our study, 35% hypothyroid patients (as per ICD-10 criteria) suffered from statistically significant (*P* value-0.000) moderate depressive episode (table 2) which was more and statistically significant among females than males (40% vs. 20%).

Evaluation by Hamilton Rating Scale for Depression (table 3) revealed depression in 61% (mild depression-29%, moderate depression-27% and severe depression-05% patients). It also revealed more and statistically significant (*P* value 0.000) in females than males (64% vs 52%). The severity level was also higher and statistically significant (*P* value – 0.000) among the females than males i.e. -mild depression (30.66% vs 24%), Moderate depression (30.66 vs 16%). However, severe depression was more common and statistically significant (*P* value– 0.000) among males than females (12% vs 02.66%).

**Generalized Anxiety Disorder:** In our study, 31% hypothyroid patients (as per ICD-10 criteria) suffered from statistically significant (*P* value-0.000) generalized anxiety disorder (table 2) which was more and statistically significant among females than males (33.33% vs. 24%).

Evaluation by Hamilton Anxiety Scale scores (table 4) re-

Psychiatric disorders	Hypothyroid Patients			Control			Z- test	
	Male N=25	Female N=75	Total N=100	Male N=25	Female N=75	Total N=100	Z	P
Moderate Depressive Episode	05(20%)	30(40%)	35%	01(04%)	04(05.33%)	05%	5.30	0.000-S
Generalized Anxiety Disorder	06(24%)	25(33.33%)	31%	03(12%)	08(10.66%)	11%	3.47	0.000-S
Suicidal Ideations	05(20%)	35(46.66%)	40%	03(12%)	02(02.66%)	05%	5.93	0.000-S
Sexual Disorders	13(52%)	15(20%)	28%	02(08%)	04(05.33%)	06%	4.14	0.000-S
Male Erectile Disorder	08(32%)	NA	08%	02(08%)	NA	02%		
Premature Ejaculation	02(08%)	NA	02%	NIL	NA	00%		
Delayed Ejaculation	NIL	NA	00%	NIL	NA	00%		
Hypoactive Sexual Desire Disorder	03(12%)	15(20%)	18%	NIL	04(05.33%)	04%		

Z- test- Z- test of significance; P-P Value; Z- Z Value; S-Significant: NA- Not Applicable

**Table-2:** Psychiatric Disorders Among 100 Hypothyroid Patients

Depression Scores	Hypothyroid Patients			Control			Z-Test	
	Male N=25	Female N=75	Total N=100	Male N=25	Female N=75	Total N=100	Z	P
0-7(No Depression)	12(48%)	27 (36%)	39%	16(64%)	68(90.66%)	84 %	6.54	0.000(S)
8-12 (Mild)	06(24%)	23 (30.66)	29%	06(24%)	04(5.33%)	10%	3.39	0.000(S)
13-15 (Moderate)	04 (16%)	23 (30.66%)	27%	02(08%)	03(04%)	05%	4.24	0.000(S)
16 or more (Severe)	03 (12%)	02 (02.66%)	05%	01(04%)	00(0.00%)	01%	3.21	0.000(S)

**Table-3:** Distribution of depression scores on Hamilton Rating Scale for Depression

vealed anxiety in 47% (mild anxiety -13%, moderate anxiety -27% and severe anxiety -07% patients). It also revealed more and statistically significant anxiety ( $P$  value 0.000) in males than females (48% vs 46.66%). However, the severity level was higher and statistically significant ( $P$  value – 0.000) among the females than males i.e. – Moderate and severe anxiety (40% vs 16%). However, mild anxiety was more common in males than females (32% vs 06.66%) but it was not statistically significant ( $P$  value– 0.157) in comparison to controls .

**Suicidal Ideations:** The study also revealed (table 2) that 40% ( $P$  value-0.00) patients expressed suicidal ideations (46.66% females and 20% males).

**Sexual Disorders:** In addition to above, a considerable and statistically significant number of patients also suffered (table 2) from sexual disorders- 28% ( $P$  value 0.000) viz 52% males and 20% females.

## DISCUSSION

Table-2 shows that clinically (ICD-10) present study revealed a considerable amount of psychiatric disorders (66%) in hypothyroid patients (Moderate depressive episode in 35% and Generalized anxiety disorder in 31%). In addition to above, a significant number of hypothyroid patients also suffered from other psychiatric morbidities (Sexual disorders- 28% and suicidal ideations-40%).

**Moderate Depressive Episode:** The disturbances in mood/ depression are more common among hypothyroid patients. However, thyroid functions are usually normal in depressed patients.<sup>8</sup>

The connection between hypothyroid and depression is well known and even mild cases of low thyroid function can cause major depression.<sup>1,9</sup> Depressive affect has been reported as a frequent association with hypothyroid (Whybrow et al.1969) and a regular feature of early case series.<sup>10</sup>

In our study, 35% hypothyroid patients (as per ICD-10 criteria) suffered from moderate depressive episode (table 2) and 61% depression (mild depression-29%, moderate depression-27% and severe depression-05% patients) on Hamilton Rating Scale for Depression (table 3).

The moderate depressive episode (table 2) was more common and statistically significant ( $P$  value – 0.000) among females than males (40% vs. 20%). The evaluation by Hamilton Rating Scale for Depression (table 3) also revealed that

more females than males (64% vs 52%) had depression. The severity level was also higher and statistically significant ( $P$  value – 0.000) among the females than males i.e. -mild depression (30.66% vs 24%), Moderate depression (30.66 vs 16%). However, severe depression was more common and statistically significant ( $P$  value– 0.000) among males than females (12% vs 02.66%).

Our study also supports the findings of other researches where depression has been reported in 28% to 50 % of the sample (3, 11).

**Generalized Anxiety Disorder:** The various studies<sup>12,13</sup>, have revealed that the incidences of anxiety disorders are more common in most of the hypothyroid patients.

In our study, 31% hypothyroid patients (as per ICD-10) suffered from Generalized Anxiety Disorder (Table-2) and the evaluation by Hamilton Anxiety Scale (table 4) revealed 47% anxiety disorder (mild anxiety-13%, moderate anxiety-27% and severe anxiety-07%).

The generalized anxiety disorder (table-2) was more common and statistically significant ( $P$  value – 0.000) among females than males (33.33% vs. 24%). The evaluation by Hamilton Anxiety Scale (table-4) revealed that more males than females suffered from statistically non-significant ( $P$  value – 0.157) mild anxiety (32% vs. 06.66%) in comparison to controls, but more and statistically significant ( $P$  value – 0.000) moderate anxiety in females than males (33.33% vs. 08%).The severe anxiety was also more common and statistically significant ( $P$  value – 0.000) in males than females (08% vs. 06.66%). Our study is consistent with the findings of other researchers where anxiety disorders were reported in 30 to 40% of the sample.<sup>14,15,16</sup>

**Sexual disorders:** In our study, 28% hypothyroid patients suffered from sexual disorders (table-2) and revealed more and statistically significant ( $P$  value – 0.000) sexual disorders in males than females (52% vs. 20%).

The detailed evaluation (table-2) also revealed more hypoactive sexual desire disorder in females than males (20% vs. 12%). The other sexual disorders in males were male erectile disorder (32%) and premature ejaculation (08%). The total of hypoactive sexual desire disorder and male erectile disorder was 44% but there was not a single case of delayed ejaculation. It is stressed that all the sexual disorder cases were from moderate depressive disorder and generalized anxiety disorder and not a separate entity.

A multicentre study on the prevalence of sexual symptoms in male hypothyroid patients by Carani C et al<sup>17</sup>, the preva-

Anxiety scores	Hypothyroid Patients			Control			Z-Test	
	Male N=25	Female N=75	Total N=100	Male N=25	Female N=75	Total N=100	Z	P
No anxiety	13 (52%)	40 (53.33%)	53%	20(80%)	67(89.33%)	87%	5.24	0.000(S)
0-21 (Mild)	08 (32%)	05 (06.66%)	13%	02(08%)	05(06.66%)	07%	1.41	0.157(NS)
22-35 (Moderate)	02 (08%)	25 (33.33%)	27%	03(12%)	02(02.66%)	05%	4.24	0.000(S)
36 or more (Severe)	02 (08%)	05 (06.66%)	07%	00(00%)	01(01.33%)	01%	2.11	0.030(S)

NS = Not Significant

**Table-4:** Distribution of anxiety scores on Hamilton Anxiety Scale

lence of hypoactive sexual disorder, delayed ejaculation and erectile dysfunction was 64.3% and premature ejaculation was 7.1 % of the cases which matches with 08% cases of premature ejaculation in our study. However, the difference of 12% in prevalence of male sexual disorders between our study and above study may be due to absence of delayed ejaculation cases in our study.

**Suicidal Ideations:** Our study (table-2) revealed that a significant number of patients (40%) expressed suicidal ideations which were more and statistically significant (P value – 0.000) in females than males (46.66% vs. 20%). However, no hypothyroid patients in our study attempted or committed suicide. All the cases who expressed suicidal ideations suffered from all the 03 disorders (moderate depressive disorders, generalized anxiety disorders and sexual disorders). The risk of suicide must also be addressed in patients suffering from an affective illness regardless of etiology. Parker reported on a patient in 1935 who while suffering from Myxoedema and depression, jumped to his death from a tall building.<sup>18</sup>

**Strengths of the study:** We have categorically inquired about suicidal ideations and complaints of sexual disorders both from male and female patients. This has given strength to our study in finding out more hypoactive sexual desire disorder among females than males (20% vs 12%) and suicidal ideations (46.66% vs 20%). The other studies have not gone in details of above morbidities especially in females.

**Limitations of the study:** Our study has assessed only emotional disorders like depression and anxiety and their related disorders namely sexual disorders and suicidal ideations. However, other psychiatric disorders like cognitive disorders (dementia and others) have not been explored due to non-application of related neuropsychological tests. The details of primary causative major psychiatric disorders like depression and anxiety for sexual disorders and suicidal ideations, the effect of duration of illness and other sociodemographic factors on psychiatric morbidity have also not been studied.

## CONCLUSIONS

The present study showed a considerable amount of psychiatric morbidity. Hence, it is recommended that a detailed psychiatric work up to be sought by treating physician in all hypothyroid patients so that preventable and treatable psychiatric morbidity is not missed as many patients may initially present only with psychiatric signs and symptoms. The timely intervention may even reverse the conditions like dementia.

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# Correlation between Oxidative Stress and Chronic Kidney Disease in Thyroid Disorders

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## ABSTRACT

In recent years chronic Kidney Disease (CKD) has emerged as a prevalent and serious threat. The traditional risk factors are no longer able to explain the reason behind increased number of CKD. Thyroid hormones have many direct and indirect effects on renal development, renal hemodynamics, Glomerular Filtration Rate (GFR), and sodium and water homeostasis. Both hyperthyroidism and hypothyroidism are associated with clinically important alterations in kidney function. Oxidative stress is very common in CKD patients and is considered to be an important pathogenic mechanism. Both thyroid disorders lead to oxidative stress. Hyperthyroidism causes increased oxygen consumption in mitochondria and leads to increased Reactive oxygen species (ROS). Hypothyroidism leads to increased triglycerides, Low Density Lipoproteins (LDL) and cholesterol and decrease in High Density Lipoproteins (HDL) in the body that results in enhanced LDL oxidation leading to oxidative stress. This review describes the effect of thyroid disorders on oxidative stress and kidney function, the molecular pathways that are altered and the relationship between oxidative stress and kidney dysfunction in Thyroid Disorders. Literature was searched for articles using different search engines with keywords like thyroid, triiodothyronine, tetraiodothyronine, thyroxin, hypothyroidism, hyperthyroidism, thyroid disorders, and renal function, glomerular filtration rate, glomerulonephritis, chronic kidney disease, oxidative stress, and renal carcinoma. The most relevant and current articles were selected. After a thorough analysis of the data available, the present article was compiled. The older references were consulted to include the earlier developments in this area.

**Key-words:** Thyroid Disorders, Hyperthyroidism, Hypothyroidism, Oxidative Stress, Free Radicals, Reactive Oxygen Species, Chronic Kidney Disease, CKD

## INTRODUCTION

According to a recent study the prevalence of Chronic Kidney Disease (CKD) in India was observed to be 17.2 % out of which seven percent were with only stage one.<sup>1</sup> Thyroid and kidney play important roles in each other's function. Thyroid dysfunction affects renal physiology and development by various direct and indirect mechanisms. Hyperthyroidism and Hypothyroidism both are associated with increased oxidative stress.<sup>2</sup> There are various mechanisms responsible for the progression of kidney damage and thyroid disorders induced oxidative stress is one of them. This review focuses on the important and clinically relevant interactions between thyroid function and renal function, which are essential from

the perspective of patient management

## MATERIALS AND METHODS

Literature was searched for articles using different search engines with keywords like thyroid, triiodothyronine, tetraiodothyronine, thyroxin, hypothyroidism, hyperthyroidism, thyroid disorders, and renal function, glomerular filtration rate, glomerulonephritis, chronic kidney disease, oxidative stress, and renal carcinoma. The most relevant and current articles were selected. After a thorough analysis of the data available, the present article was compiled. The older references were consulted to include the earlier developments in this area.

## INTERACTION BETWEEN THYROID AND KIDNEY

There is a special interaction of thyroid and kidneys. Thyroid dysfunction can alter Renal Blood Flow (RBF), Glomerular Filtration Rate (GFR), electrolyte homeostasis, tubular function and kidney structure; on the other hand, kidney performs a key role in the metabolism, degradation and excretion of thyroid hormone and its metabolites. Kidney disease may predispose to alterations in regulation of the hypothalamic–pituitary–thyroid axis, as well as changes in thyroid hormone uptake and action. Clinical conditions such as chronic metabolic acidosis, chronic malnutrition and fasting up to certain extent may affect the synthesis of the T<sub>3</sub> from T<sub>4</sub> in CKD or it may be due to a low peripheral conversion of T<sub>3</sub> from T<sub>4</sub> due to high concentration of cytokines.

## THYROID HORMONES AND THEIR DISORDERS

Thyroid gland is one of the most important glands of human body as it affects most of the physiological functions in the body. Thyroid produces two hormones Tri-iodothyronine (T<sub>3</sub>) and Tetra-iodothyronine (T<sub>4</sub>) or Thyroxine. The synthesis and secretion of thyroid hormones [i.e. tri-iodothyronine

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(T<sub>3</sub>) and Thyroxin(T<sub>4</sub>) are stimulated by Thyroid Stimulating Hormone(TSH) which is released from the pituitary gland, which is further regulated by Thyrotropin-Releasing Hormone (TRH) from the Hypothalamus.

TRH and TSH are regulated by feedback inhibition from circulating T<sub>4</sub>. These hormones regulate basal metabolism, oxidative metabolism, development, protein synthesis as well as many other endocrine glands. Any disorder of the thyroid gland resulting in imbalance of thyroid hormones exerts negative effects on the functioning of various organs of the body. Hypothyroidism and Hyperthyroidism are the common thyroid disorders in which thyroid hormones secretion is decreased and increased respectively. In a cross sectional, multicenter, epidemiological study conducted in eight major cities of India on 5360 adults, the prevalence of Subclinical Hypothyroidism, Hypothyroidism, Subclinical Hyperthyroidism, and Hyperthyroidism was 8.02%, 10.95%, 1.27%, and 0.67% respectively.<sup>3</sup>

## OXIDATIVE STRESS

Oxidative stress may be defined as a condition when production of oxidants or Reactive Oxygen Species (ROS) exceeds local anti-oxidant capacity. ROS are generated by the oxidative phosphorylation in the cell. ROS are highly reactive molecules because they contain unpaired electron. ROS comprise partially reduced forms of oxygen such as H<sub>2</sub>O<sub>2</sub>, hydroxyl radicals (OH<sup>•</sup>) and super oxide anions(O<sub>2</sub><sup>-</sup>), nitric oxide (NO) and lipid peroxides.

ROS are very strong oxidizing agents which may damage cell structures like cell membranes, cellular proteins, lipids and nucleic acids. As these molecules are generated by the cells normally also, only their presence cannot explain oxidative stress but when antioxidant defence system fails to cope up with these, these imbalance between ROS and antioxidant system create oxidative stress.

## OXIDATIVE STRESS IN TYROID DISORDERS

Some studies suggest that the hyper metabolic state of hyperthyroidism is associated with increased ROS production<sup>4</sup> while the hypo metabolic state of hypothyroidism leads to reduced ROS production.<sup>5</sup> Indeed both hyperthyroidism and hypothyroidism are associated with enhanced oxidative stress involving enzymatic and non-enzymatic antioxidants. Thyroid hormones have great impact on energy metabolism. Mitochondria, the powerhouse of cellular life are the primary target for oxidative stress induced tissue damage due to thyroid hormones. T<sub>3</sub> increases O<sub>2</sub> consumption which leads to enhanced reactive oxygen species and reactive nitrogen species generation in the target tissues, which results in increased consumption of cellular antioxidants thus inducing oxidative stress.

Thyroid hormones affect the expression and/or activity of many ion channels and transporters. In some cases, this is due to direct binding of thyroid hormone to the promoter region of a transporter gene. Thyroid hormones can work as oxidants and produce DNA-damage, probably through the phenolic group, similar to that of steroidal estrogens.<sup>6</sup> In ex-

perimental studies, T<sub>3</sub> induced hyperthyroidism was found to be associated with altered lipid peroxidation indices, including elevated levels of TBARS and hydroperoxides.<sup>7</sup>

Hypothyroidism also results in oxidative stress. In hypothyroidism, the level of triglycerides is increased, due to decreased activity of lipoprotein lipase in adipose tissue.<sup>8</sup> T<sub>3</sub> induces LDL receptor gene expression that helps in LDL clearance in liver, but in hypothyroidism number of LDL receptors is decreased in liver and due to that LDL clearance is delayed resulting in increased level of LDL and ultimately causing hypercholesterolemia.

In hypothyroidism, Total HDL levels are also decreased due to the decreased activity of Cholesterol Ester Transfer Protein (CETP) and hepatic lipase.<sup>9</sup> All these changes in lipid metabolism result in enhanced LDL oxidation reflected in the increased levels of lipid peroxidation markers such as MDA.<sup>10</sup> It has been shown by many studies that levels of MDA and NO are increased in hypothyroidism.<sup>11</sup> MDA levels are elevated even in subclinical Hypothyroidism.<sup>12</sup>

## THYROID DISORDERS, OXIDATIVE STRESS: EFFECTS ON KIDNEY FUNCTION

Thyroid disorders affect the functioning of kidney by various means. RBF and GFR both are increased in hyperthyroidism. Thyroid hormones can regulate the number of cardiac beta-adrenergic receptors. The increased number of receptors may be responsible for the enhanced catecholamines sensitivity of beta-adrenergic coupled cardiac responses in hyperthyroid patients. The level of thyroid hormones affects the intrinsic contractile state of cardiac muscles and in addition modifies the responsiveness of cardiac muscles to inotropic agents.<sup>13</sup> The increase in RBF is due to increased cardiac output by the positive chronotropic, inotropic effects and reduced systemic vascular resistance. Alongwith that there is reduced renal vasoconstrictor endothelin. All these factors result in increased RBF.

The activation of Renin-angiotensin-aldosterone-system (RAAS) by thyroid hormone, alongwith increased RBF, results in increased GFR. The GFR increases by about 18-25% in hyperthyroid patients.<sup>14</sup> T<sub>3</sub> hormone increase, in hyperthyroidism, results in the increased tubular mass, renal mass and tubular re-absorptive capacity.<sup>15</sup> Increase of Urinary-N-acetyl-b- D-glucosaminidase (NAG) in hyperthyroidism shows disruption of glomerular basement membrane due to hyper filtration, hypertrophy and hyperplasia.<sup>16</sup>

The effects of hypothyroidism are quite opposite on kidneys as compared to hyperthyroidism. The RBF is decreased due decreased cardiac output by the negative chronotropic and inotropic effects.<sup>17</sup> In hypothyroidism there is intrarenal vasoconstriction, reduced renal response to vasodilators and increased peripheral vascular resistance. Along with that there is decreased angiotensin II and impaired RAAS activity in hypothyroidism which results in reduced GFR.

Cystatin C (CysC) is a small, basic protein that works as a physiologic inhibitor of cysteine proteinases. CysC is considered to be produced at a constant rate by most nucleated cells. The production of CysC is not influenced by inflam-

Hyperthyroidism	Hypothyroidism
Increased Renal mass	Decreased Renal mass
Increased Tubular mass	Decreased Tubular mass
Increased Vasodilators	Decreased Vasodilators
Decreased Vasoconstrictors	Increased vasoconstrictors
Increased RAAS Activity	Decreased RAAS Activity
Increased Metabolism	Decreased Metabolism
Increased Tubular reabsorptive capacity	Decreased Tubular reabsorptive capacity
Increased GFR	Decreased GFR
Increased RBF	Decreased RBF
Increased oxidative stress	Increased oxidative stress

**Table-1:** Effect of thyroid Disorders on renal physiology and function

Oxidative stress markers	Hyperthyroidism	Hypothyroidism
MDA	Increased	Increased
Nitric Oxide	Decreased	Increased
SOD	Decreased	Decreased
Glutathione Peroxidase	Decreased	Decreased
Vitamin A	Decreased	Decreased
Vitamin C	Decreased	Decreased
Vitamin E	Decreased	Decreased

**Table-2:** Effect Of Hyperthyroidism and Hypothyroidism On Oxidative Stress

Tests	Effect
Creatinine	Increase
Urea	Increase
Uric acid	Increase
Serum Albumin	Decrease
Total Protein	Decrease
Urinary protein	Increase

**Table-3:** Effect of oxidative stress on kidney functions

matory states.<sup>18</sup> CysC is freely filtered at the glomerulus and practically completely reabsorbed and catabolized by tubular cells. Compared to serum creatinine, CysC has a lower inter-individual variability and is not correlated to lean tissue mass, gender, and age.<sup>19</sup>

CysC has been proved to be a reliable marker of GFR in healthy adults and children as well as in patients with renal disorders of neoplastic, rheumatologic, hepatic, and nephrologic origin.<sup>20</sup> Studies show that serum cystatin C levels generally trend in the opposite direction to those of creatinine<sup>21</sup>; that is, cystatin C is commonly elevated in hyperthyroid patients and decreased in hypothyroid patients. This pattern of results has been shown in a wide range of causes and severity of thyroid diseases<sup>22</sup> although the exact mechanism is not known but it is hypothesized to be a direct effect of thyroid hormone on cystatin C production.

Along with all these and many other effects both hyperthyroidism and hypothyroidism cause oxidative stress which further deteriorate the negative effects of these thyroid disorders.

Oxidative stress is associated with a variety of renal diseases such as glomerulonephritis, acute or progressive renal failure or tubulointerstitial nephritis.<sup>23,24</sup> As ROS affect Cell cycle regulation that may cause tubular cell hypertrophy.<sup>25</sup> Oxidative stress is also proved to encourage apoptosis<sup>26</sup>, a reason behind the functional tissue loss in CKD. Nuclear factor  $\kappa$ -B, a family of rapid acting nuclear transcription factors, regulate many genes involved in inflammation, immunity, apoptosis, cell multiplication are activated by ROS. Due to all this, these transcription factors start signaling pathways involved in renal fibrosis.<sup>27</sup>

Angiotensin II is strong vasoconstrictor and sodium retaining hormone and it is very important for the regulation of sodium transport in Kidney and Blood pressure. Oxidative stress can modulate Angiotensin II type 1 receptor (AT<sub>1</sub>R) expression.<sup>28</sup> Thus during oxidative stress, up-regulation of AT<sub>1</sub>R can result in sodium retention and leads to development of hypertension. It has been shown that AT<sub>1</sub>R is responsible for Na<sup>+</sup> retaining effects of Angiotensin II in the Kidney.<sup>29</sup> ROS promote the formation of oxidized amino acids and thus can directly modulate the function of Proteins. It has been shown in studies that Advanced Glycosylation End products occur in  $\beta$ 2- microglobulin deposits of long term hemodialysis patients, suggesting that oxidative stress promotes amyloidosis due to protein denaturation.<sup>30</sup>

## CONCLUSION

Thyroid disorders and CKD, both appear to be as noticeable medical conditions in India. As these diseases are becoming quite ubiquitous, it is necessary to analyze all the factors associating both of them either physiological or pathological. Both thyroid disorders (hypothyroidism or hyperthyroidism) affect kidney functions through various factors. It has been confirmed by many studies that oxidative stress is a credible cause of kidney dysfunction. The analysis *vide supra* advocate ROS might be one of the major causes of kidney dysfunction in thyroid disorders and this should be verified experimentally.

Any alterations in the thyroid status may cause subtle changes in kidney tissue leading to oxidative tissue injury and thyroid hormone replacement therapy alone might not be sufficient in bringing back the tissue parameters to normal levels. The role of supportive antioxidant therapy to minimize tissue damage and accompanying symptoms in thyroid disorders is the question to be answered by thorough research.

The use of antioxidants targeted to specific pathways that are altered in thyroid disorders might prove beneficial, but for this different antioxidants will be needed as a multidrug therapy to target oxidant modifying pathways.

Progressive approaches such as target based antioxidant treatment and gene therapy using viral vectors to modulate the expression of antioxidant genes appear to be a promising strategy to counter oxidative stress induced tissue damage.

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# Comparative Study of Intra-Cervical Foley's Catheter and Intra-Cervical PGE<sub>2</sub> Gel For Pre-Induction Ripening of Cervix

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## ABSTRACT

**Introduction:** Numerous techniques have been used to ripen the unfavourable cervix to achieve the changes necessary for labour. Prostaglandins are the most commonly used pharmacological agents for ripening of cervix and PGE<sub>2</sub> gel is the agent of choice for this purpose.

**Materials and methods:** In present study 100 singleton pregnant women who were counselled & in whom cervical ripening and labour induction was indicated were studied. 50 women received Foley's catheter intra-cervically and bulb inflated with 30ml of normal saline & the remaining 50 women received 0.5mg of Dinoprostone gel.

**Results:** Majority of patients in Foley's group had bishops score 2 in 48% & 50% in dinoprostone forming a major group. The mean induction delivery interval was 13.9 hrs & 11.5 hrs in primigravidae & multigravidae respectively, giving a total mean of 12.5 hrs. 82% had vaginal delivery & 18% had caesarean delivery in Foley's group as compared to dinoprostone where vaginal delivery was 68% & caesarean delivery 36%. The rate of failed induction was 22% in Foley's group, the major indication being fetal distress & secondary arrest of dilatation. In dinoprostone group 36% cases were failed induction, major cause was secondary arrest of dilatation. There was 10% incidence of side effects of dinoprostone of which 2% hyper stimulation, 2% fever, 2% vomiting, 2% diarrhoea, 2% PPH. In Foley's group the incidence of side effect is 2% vomiting. There was 4% incidence of NICU admission in Foley's group & 12% in dinoprostone group.

**Conclusion:** Study suggest that Foley's catheter & PGE<sub>2</sub> gel are showing almost equal results, but Foley's catheter is a safer, easier, cheaper, effective method of pre-induction cervical ripening and can be used in PGE<sub>2</sub> contraindicated cases.

**Key words:** Foley's catheter, Dinoprostone, Cervical ripening.

## INTRODUCTION

One of the most important tools in an obstetrician armamentarium is the capacity to deliver a patient when required. This is possible by induction of labour or by caesarean section. Labour induction is an artificial initiation of labour prior to its spontaneous onset for the purpose of accomplishing delivery of feto-placental unit.<sup>1</sup> The aim of induction of labour is to achieve vaginal delivery in advance of the normal timing parturition without subjecting the mother or fetus to under risk. Induction of labour is often essential when obstetric or medical problems affect the fetal or maternal well being. In view of this, the method of induction has to be both safe and effective. It is indicated where the benefits to mother/fetus outweigh the benefits of continuing pregnancy.<sup>2</sup> The transition from pregnancy to labour is a gradual process

called pre-labour which takes four to five weeks and starts around 35 weeks of gestation and culminates with clinical labour at term. The critical events in pre-labour are myometrial excitement and cervical ripening. The success of induction depends on the degree of these pre-labour changes. But when the fetus is compromised or when continuation of pregnancy may harm the mother or fetus we cannot wait until nature brings about cervical ripening. The unripe cervix impedes attempts and predisposes patients to increased fetal and maternal morbidity.

There is little doubt that cervical ripening facilitates labour and ultimately influences the process of vaginal delivery.<sup>3,4</sup> Induction of labour when cervix is unripe is associated with maternal complications and high rates of induction failure.<sup>5</sup> Variety of cervical scoring systems are described but Bishops pelvic score is most commonly used for cervical assessment prior to induction.<sup>6</sup> Cervix is considered unfavourable if the derived score is <6 and cervical ripening is indicated prior to artificial rupture of membranes and oxytocin to reduce the incidence of failed induction and caesarean delivery.<sup>7</sup>

Several factors seem to play a role in the ability to successfully induce labour. One of the most important factor appears to be the cervix i.e., defined as favourable for vaginal delivery. Bishop<sup>8</sup> first described the correlation between the presence of favourable cervix and subsequent vaginal delivery. Successful outcome of induction relies on cervical favourability. So there comes the need for improving cervical score in those women with unfavourable cervix for success of induction of labour and subsequent vaginal delivery. This process has been described as pre-induction cervical ripening. Numerous techniques have been used to ripen the unfavourable cervix to achieve the changes necessary for labour.<sup>9,10</sup> Presently pharmacological and mechanical agents are used to modify the cervical status. Prostaglandins are the most commonly used pharmacological agents for ripening of cervix and PGE<sub>2</sub> gel is the agent of choice for this purpose<sup>11</sup>, but expensive.<sup>12</sup>

A variety of more economical mechanical methods are also

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used for cervical ripening like intra cervical Foley's catheter, bougie and hygroscopic laminaria tents. The use of Foley's catheter for cervical ripening was first described by EMBREY and MOLLISON in 1967.<sup>13</sup> There after various balloon catheters have been used to induce cervical ripening<sup>14</sup>

The human cervix is an organ of diverse properties. Ripening of cervix takes place during pre-labour phase, resulting in increased softening, effacement, distensibility and early dilatation. Pre induction cervical ripening can be divided into pharmacological and mechanical methods. One of the most common pharmacological methods of cervical ripening is the use of a Prostaglandin E<sub>2</sub> gel. Use of Foley's catheter for the induction of labour was first described by KRAUSE IN 1853.<sup>15</sup> In 1967 Embrey and Mollison reported a 94% successful induction rate after using Foley's catheter for cervical ripening. The Foley's catheter appears to effect the cervical ripening not only through direct mechanical dilatation of cervix but through release of prostaglandins.

The release seem to be increased by further separation of amnion from the decidua.<sup>16</sup> This led many investigators to instil fluid through an in place Foley's Catheter provides a possible increase in success of pre induction cervical ripening. The aim of this study is to compare the efficacy of intra cervical Foley's catheter and intra cervical PGE<sub>2</sub> gel for pre induction ripening of cervix. Termination of pregnancy by inducing labour is often indicated in obstetrics patients, when continuation of pregnancy may harm the mother or fetus.

## MATERIALS AND METHODS

This is conducted in Department of obstetrics and gynaecology at the Government Maternity Hospital, Hanamkonda, attached to Kakatiya Medical college, Warangal, Study period starts from December 2011. The study group consisted of 100 antenatal women admitted in the hospital for the safe institutional delivery who required pre-induction cervical ripening.

Labour was induced in fifty women with Foley's catheter

and remaining fifty women with similar inclusion criteria with 0.5gm Dinoprostone gel and thus efficacy of both methods is compared.

**Inclusion Criteria:** Gestational age  $\geq 37$  weeks, Singleton pregnancy, Cephalic presentation, Parity less than 4, Reassuring fetal status and Bishop's score  $\leq 6$

**Exclusion Criteria:** Twin pregnancy, Parity more than 4, Malpresentations, Ruptured membranes, APH, Polyhydramnios, Previous LSCS and Medical disease complicating pregnancy

Patients at term with various indications for induction of labour will be included in the study after a written and valid consent. Patients are admitted and will be evaluated by a proforma which includes history, physical examination, obstetric examination, ultrasound and Doppler study of the fetus.

The patients will be divided into two groups,

Group A intracervical Foley's catheter insertion size no:16 with 30ml of normal saline and

Group B intra cervical PGE<sub>2</sub> gel administration will be done.

The pre and post induction cervical ripening will be compared between two groups. The induction delivery interval, maternal and fetal out come and need for augmentation of labour also will be compared.

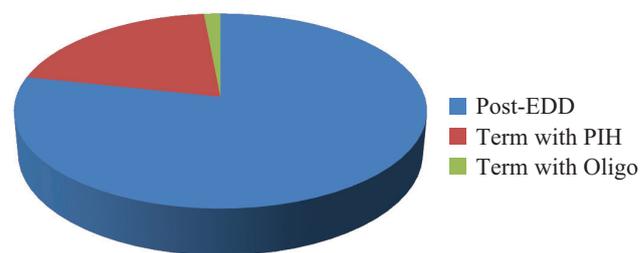
## RESULTS

Total number of patients studied was 100. Fifty patients were induced with Foley's catheter and bulb inflated with 30ml of normal saline and the remaining 50 patients were induced with 0.5mg of PG E<sub>2</sub> gel intracervically.

From the Table 1 it can be seen that in the Foley's group out of 50 patients, 34 were booked and 16 were unbooked, giving an incidence of 68 and 32% respectively. In the dinoprostone group, out of 50 patients, 35 were booked and 15 were unbooked, giving an incidence of 70% and 30% respectively. Parity was compared in both groups. Found to be similar with no statistical difference. Primi gravidae form the largest group in the study being 80% and 88% in Foley's and Dinoprostone respectively.

	Foley's		Dinoprostone	
	No. of patients	%	No. of patients	%
Booked	34	68%	35	70%
Unbooked	16	32%	15	30%
Parity				
Primi	40	80%	44	88%
Multi	10	20%	06	12%

**Table-1:** Booking and Parity



**Figure-1:** Indications for induction

Bishop's score		1 to 3		4 to 6		7 to 10	
		No. of patients	%	No. of patients	%	No. of patients	%
Foley's	Primi	1	02%	30	60%	09	18%
	Multi	2	04%	04	08%	04	08%
Dino-Prostone	Primi	10	20%	32	64%	02	04%
	Multi	02	04%	02	04%	02	04%

$\chi^2$  equals to 10.165 with 2 degrees of freedom the p value equals to 0.0062 the association is considered to be statistically significant.

**Table-2:** Modified Bishops score after induction

Drug	Parity	Idi (hrs)	Term-pih	Post edd	Term-oligo	Hrs	Mean hrs
Foley's	Primi	<6hrs	-	-	-	11.8	10.2
		6 to12hrs	2	15	-		
		12to18hrs	4	17	2		
		18to24hrs	-	-	-		
	Multi	<6hrs	1	1	-	8.6	
		6to12hrs	2	5	1		
		12to18hrs	-	-	-		
		18to24hrs	-	-	-		
Dino-Pro-Stone	Primi	<6hrs	1	1	-	13.9	12.7
		6-11 hrs	1	3	1		
		12-18 hrs	6	23	1		
		18-24 hrs	2	4	1		
	Multi	<6hrs	-	-	-	11.5	
		6-11 hrs	-	2	1		
		12-18 hrs	-	2	1		
		18-24 hrs	-	-	-		

Table-3: Induction to delivery interval

Indication	Foley's	Dinopros-tone
Fetal distress		
Meconium stained Liquor	6	7
Bradycardia due to hyper stimulation	0	1
Failure to progress		
Deep transverse arrest	0	0
Secondary arrest of dilatation	5	10
Complications		
Tachysystole	0	0
Hyper stimulation	0	1
Fever	0	1
Vomiting	1	1
Diarrhoea	0	1
Post partum haemorrhage	-	-
Atonic	0	1
Traumatic	0	0
No. of NICU admissions	4	12

Table-4: Failed induction

The various indications for induction were term with PIH, Post EDD, Oligo with AFI-6. Post EDD formed largest group for induction in both groups.

In Foley's group majority of primi gravidae delivered within 12-18 hrs. In multigravidae majority is between 6-12 hrs indicating more effective in multies. In Dinoprostone group majority of primi gravidae delivered between 12-18 hrs, In multigravidae equally in 6-12 hrs and 12-18 hrs.  $\chi^2$  equals to 17.54 with 3 degrees of freedom the p value equals to 0.00054 the association is considered to be statistically significant

Thus in induction delivery interval in Foley's group among primi was 11.8 hrs and in multi is 8.6 hrs and giving a total mean of 10.2 hrs The mean induction delivery interval in dinoprostone group among primi is 13.9 hrs and in multi is 11.5 hrs giving a total mean of 12.7 hrs.

In this study caesarean section in Foley's was 18% and Dinoprostone was 32%

The rate of Failed induction was 22% in Foley's group and 36% in dinoprostone group. In Foley's the indication were Fetal distress and secondary arrest of dilatation with 12% and 10% each. In dinoprostone group the indications were Fetal distress 16% and secondary arrest of dilatation 20%. There are 2% incidence of side effects in Foley's group and 10% incidence of side effects in dinoprostone group. In Foley's group 4 admissions were made since Meconium stained liquor was observed. In Dinoprostone group 12 cases were admitted in NICU

## DISCUSSION

The secret of induction of labour lie in replicating as closely as possible, the process of spontaneous parturition. Ideally a cervical ripening cervical remodelling without stimulating Uterine activity. It should be effective, convenient, safe and inexpensive. Most common indication for induction was post dated pregnancy and PIH.<sup>17,18,19</sup> Cervical ripening is a normal prelude to onset of Myometrial contraction, it is important to choose a method which will ripen the cervix and have a successful outcome of planned induction of labour.

In our study both Foley's and Dinoprostone have been equally effective in achieving cervical ripening and improving Bishops score and promoting changes resembling physiological events of ripening and labour. In today's expensive world, Foley's catheter which is half the price of Dinoprostone gel is definitely a safer and cheaper alternative. The use of Foley's catheter to effect cervical ripening was first described by Embrey Mollison in.<sup>20</sup>

The mechanical action of Foley's balloon strips the fetal membranes from the LUS and start the process of prostaglandin release which increase the consistency and effacement of cervix. The advantage of such mechanical methods of induction are simplicity of its use, potential for reversibility, reduction in certain side effects like excessive uterine activity and low cost.<sup>21</sup>

Foley's catheter can also be used in case of Bronchial asthma, increased intraocular pressure, post-LSCS, thus Foley's

catheter provides better alternative. In our study of 100 cases, we have analysed mean duration of labour, maternal and fetal outcome. Main argument against Foley's catheter has been risk of introduction of infection with accidental rupture of membranes.

In our study, no such accidental rupture has occurred. Foley's catheter acts as a mechanical dilator and improves dilatation rather than effacement of cervix, whereas Dinoprostone gel acts by softening and increases effacement of cervix, rather than dilatation. For successful Foley's catheter induction, immediate Amniotomy followed by oxytocin drip is needed as a cervix tends to close down after removal of Foley's.

Prostaglandin in general especially PGE<sub>2</sub> are extensively used for cervical ripening. They reduce the likelihood of not being delivered in 24hrs and decrease the use of oxytocin for augmentation but with higher rate of uterine hyper stimulation.<sup>22</sup> Dinoprostone gel is expensive, twice as much as price of Foley's, also it has to be stored in refrigerator at 6-8°C as in our study the side effects of Dinoprostone gel like nausea, vomiting, diarrhoea are quite frequent, whereas they were absent in Foley's.

Cases of uterine hypertonicity and fetal bradycardia have been reported following use of prostaglandins and this necessitated monitoring of fetus even in pre-induction cervical ripening procedure, when these potent agents are used, as compared to Foley's where no such specific monitoring was required. Multiple studies have been done comparing effectiveness and safety between prostaglandins and Foley's catheter.

Sciscione et al.,<sup>23</sup> compared the two methods and showed that Foley's group had shorter induction delivery interval. St. Onge and Connors<sup>24</sup> found that both Foley's catheter and PGE<sub>2</sub> gel methods led to similar improvement in bishops score.

In the present study, 100 patients were studied with indications for induction of labour. These patients had poor bishops score. So pre-induction cervical ripening was done in these 100 patients, of whom 50 patients received Foley's induction extra-amniotically with bulb inflated with 30ml of normal saline and remaining 50 patients received intra cervical dinoprostone gel (0.5mg).

Induction delivery interval was significantly shorter in Foley's catheter group. Similar results were obtained by Niromanesh et al.,<sup>25</sup> and Orhue et al.,<sup>26</sup> and our present study support these results. Ghezzi et al., compared extra amniotic Foley's and PGE<sub>2</sub> gel for cervical ripening at term and concluded that Foley's catheter is a valid alternative to the application of intravaginal PGE<sub>2</sub> gel.<sup>27</sup>

James et al., also confirmed that Foley's catheter is not associated with any complications.<sup>28</sup> In majority of patients in Foley's group and dinoprostone group were booked cases. The rate of vaginal delivery was 82% in Foley's group and 68% in dinoprostone group. Studies showing vaginal delivery rate in Foley's group are; St. Onge R D, Connors G T 70.6%, Sciscion A C, MC Collough<sup>23</sup> 73%, Ezimokhai and Nwabinelli JN<sup>29</sup> 85%. Studies showing vaginal delivery rate in Dinoprostone group are; St. Onge R D, Connors G T<sup>24</sup>

70.4%, Sciscion A C, MC Collough<sup>23</sup> 71%, Ezimokhai and Nwabinelli JN<sup>29</sup> 57%.

In present study, the rate of vaginal delivery in Foley's group is consistent with Ezimokhai and Nwabinelli<sup>29</sup>. The vaginal delivery rate in dinoprostone group in present study is consistent with St. Onge R D, Connors G T<sup>24</sup> and MC Collough.<sup>23</sup> In present study it was shown that mean modified bishops score after >6hrs was more in Foley's group as compared to dinoprostone group. The mean bishops score in Foley's group was 5.8 % in dinoprostone group was 4.8%, which is consistent with Sciscion AC, MC Collough<sup>23</sup> who observed mean bishop score after >6hrs was 6.5 and 5.1 in Foley's and dinoprostone group respectively.

In the present study it was seen that induction delivery interval was shown in Foley's group compared to dinoprostone group- 10.2 hrs and 12.7 hrs respectively which is statistically significant. Studies showing induction delivery interval in Foley's group and dinoprostone group are St. Onge R D, Connors G T<sup>24</sup> 16±1.7 hrs and 21.5±3.2 hrs; Ezimokhai and Nwabinelli et al.<sup>29</sup> 9.2±2.7 and 10.6±2.5 hrs respectively. James C, peedicayil et al<sup>28</sup> showed 8.7 hrs in Foley's group. Y. Onekura et al. showed 13.1±8.1 hrs in dinoprostone.

Present study showed that Foley's catheter had induction delivery interval is less than dinoprostone and is consistent with Ezimokhai Nwabinelli et al.<sup>29</sup> Failed induction were those cases which did not fulfil the criteria for the definition of induction of labour. Thus all caesarean deliveries were considered failed induction, irrespective of cause of the same.

Caesarean delivery rate in a study was 18% and 32% in Foley's and dinoprostone group respectively. The various indications were fetal distress and failure to progress. In Foley's group both indications were almost same but in dinoprostone group failure to progress is major. Present study caesarean section rate is consistent with St. Onge and connors<sup>24</sup> study in Foley's group and Dinoprostone group with Ezimokhai Nwabinelli.<sup>29</sup>

The maternal side effects observed were Tachysystole, Hyper-stimulation, Vomiting, Diarrhoea, PPH. Cases of uterine Hyper stimulation and fetal bradycardia have been reported following use of prostaglandin and strict FHR monitoring in pre induction period is required as compared to Foley's catheter where no specific monitoring is required.

In present study no such complications noted in Foley's group but in dinoprostone group 2% was observed. In Foley's group present study showed 2% vomiting, but not significant. There was no infection. Foley's as when used ripe cervix prior to surgical induction of labour. The main argument against its use was risk of infection. Study showed no risk of infection. In dinoprostone group other complications were fever, diarrhoea, PPH. Other parameters like gestational age, parity, indications for induction, FHR and neonatal outcome have no difference in both the groups.

## CONCLUSION

Foley's catheter is safe and effective method of cervical ripening before induction of labour as dinoprostone and much more cost effective as compared to dinproston. Foley's cath-

eter is not complicated by fetal heart rate pattern abnormalities as compared to dinoprostone. So strict FHR monitoring is not required in pre-induction period. Incidence of infection, though expected in high is not found to be increased in the present study. Risk of preterm labour in subsequent pregnancy was proved to be absent by several studies with Foley's induction.

So the results of this study suggest that Foley's catheter and PGE<sub>2</sub> gel are showing almost equal results, but Foley's catheter is a safer, easier, cheaper, effective method of pre-induction cervical ripening and can be used in PGE<sub>2</sub> contraindicated cases.

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# Randomized Control Study of 600 mcg Oral vs Vaginal Misoprostol with Mifepristone for early MTP

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## ABSTRACT

**Introduction:** The present study was aimed to compare the efficacy of oral vs vaginal administration of 600 µg of misoprostol following pre-treatment with 200 mg of mifepristone to terminate pregnancy upto 63 days in a non-blinded, randomised trial

**Material and Methods:** In this study, 100 women requesting for MTP within 63 days of pregnancy were included. Initially 200 mg mifepristone was given orally; then after 48 hours those in oral group were given three tablets (200µg each) of misoprostol and those in vaginal groups came back for vaginal administration. Complete abortion rate, induction-abortion interval, duration of vaginal bleed and adverse effects were compared.

**Results:** Complete abortion rate were similar in both groups (94% in vaginal vs. 86% in oral group,  $p=0.3178$ ). However, in pregnancy of less than 49 days, complete abortion was more successful in vaginal (97%) compared to oral group (87%). Mean induction-abortion interval was 3.1 hours in vaginal as compared to 3.7 hours in oral misoprostol group, but was not statistically significant. On comparing complete abortion within 4 hours of misoprostol, a statistically significant difference was observed (93.6% in vaginal vs. 79% in oral group,  $p=0.029$ ). The adverse effects of misoprostol were significantly higher in oral group.

**Conclusion:** 200 mg mifepristone followed 48 hours later by 600 mg of misoprostol is an effective means for safe termination of pregnancy upto 63 days of gestation with vaginal route being better in terms of having early completion of abortion (within 4 hours), thus being better and more acceptable as a day care procedure.

**Keywords:** Vaginal Misoprostol, Mifepristone, medical termination of pregnancy.

## INTRODUCTION

Medical termination is the abortion of pregnancy through medications without the surgery beyond 49 days of conception. It offers immense prospective for improving abortion access and safety, as it requires a less extensive infrastructure than surgical abortion. Increased cost, longer duration of bleeding and a longer waiting period for completion are the demerits of medical termination but the women underwent medical termination feels slightly superior comfort than the surgical abortion.<sup>1</sup> Globally, 30 million abortions are done every year and safety of the procedure is consequently of global public health importance.<sup>2</sup> Medical termination regimens have a well-documented failure rate.<sup>3</sup> Research has been unremitting to progress the medical abortion regimen as its instigation. Now, the universally used regimen all through the world is mifepristone followed by a prostaglandin ana-

logue, usually misoprostol. Medical termination of pregnancy with a combination of mifepristone and prostaglandin is a relatively safe and effective choice to suction evacuation up to 63 days of gestation.<sup>4-6</sup>

In the absence of progesterone, embryo is expelled by a prostaglandin-mediated mechanism and hence Progesterone is sustaining an early pregnancy. Epostane, a 3β-hydroxysteroid dehydrogenase inhibitor, prevents progesterone synthesis however requires dosing each 6 hrs for 7 days to result abortion.<sup>7,8</sup>

Mifepristone, a derivative of norethindrone, (RU 486) is the initial vastly efficient progesterone receptor antagonist, binds to the progesterone receptor with an affinity equal to progesterone itself<sup>9</sup> but does not activate the receptor, thus exerts antiprogesterone effect. Mifepristone affects the uterus and cervix during early human pregnancy with precise actions that make it a potential for abortion. Mifepristone alters the endometrium by directly effecting the capillary endothelial cells of the deciduas, there is no direct effect on the trophoblast.<sup>10</sup> This results in separation of the trophoblast from the decidua causing bleeding and a decrease in human chorionic gonadotropin (hCG) secretion into the maternal circulation. The decidual action also increases prostaglandin release *in vitro*<sup>11</sup> and *in vivo*.<sup>12</sup> Mifepristone also sensitizes the uterus to prostaglandins and increases the efficacy of prostaglandins.<sup>13</sup> Misoprostol is a synthetic analogue of prostaglandin E1 (PGE1), chemically it is methyl 1α, 16 dihydroxy-16methyl-9-oxoprost-13-en-1-oate. It was approved by the US-FDA for the prevention of nonsteroidal anti-inflammatory drug (NSAID)-induced gastric ulcers. The prostaglandin appears to soften the cervix by increasing the proteoglycan content and changing the biophysical properties of collagen. It has been shown to be an effective myometrial stimulant of the pregnant uterus, selectively binding to the EP2/EP3 – prostanoic receptors. mifepristone to softens the cervix to expel the products of conception.<sup>14</sup>

It has also been demonstrated that the oral misoprostol dose of 400 mg was inadequate when the length of pregnancy was more than 7 weeks.<sup>15,16</sup> Studies have also shown that vag-

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inal administration of misoprostol after pre-treatment with mifepristone resulted in higher complete abortion compared to oral dose.<sup>17</sup> Hence in the present study comparison of the therapeutic regimens of mifepristone with a reduced dose 600 µg of oral versus vaginal misoprostol in terms of efficacy and safety for medical termination of early pregnancy were undertaken.

## MATERIALS AND METHODS

This study was conducted in the Department of Obstetrics and Gynaecology of Central Referral Hospital- Sikkim Manipal Institute of Medical Sciences with the Ethics Committee approval at the Central Referral Hospital. This study was a randomized longitudinal study with 100 pregnant women requesting for MTP within 63 days of pregnancy and computer generated random number sequence was used for randomization of women.

A written informed consent was taken from all the women who opted for medical termination using pills were further counseled regarding the procedure and visits for follow-up for the medical termination of pregnancy. All the women were explained that in case of incomplete abortion or continuation of pregnancy, surgical uterine evacuation was advised.

### Inclusion and Exclusion criteria

Women included in the study were >18 years, duration of pregnancy not more than 63 days, Hemoglobin greater than 10 g/L and a willingness to undergo surgical abortion. Those women with history or evidence of adrenal pathology, steroid dependent cancer, porphyria, diastolic BP > 95 mm Hg, bronchial asthma, arterial hypotension; history or evidence of thromboembolism, severe/ recurrent liver disease; suspected ectopic pregnancy; presence of IUCD; and lack of access to emergency services were excluded from the study. Computer generated random number sequence was used for randomization of women to one of the two groups. All the pregnant women were divided into two groups namely oral misoprostol and vaginal misoprostol women. During the 1<sup>st</sup> day, Ultrasonography pelvis was performed for all women to confirm intrauterine pregnancy and weeks of gestation. After demographic characteristics i.e., history, physical examination and hemoglobin, blood group and Rh type investigations, 200 mg mifepristone was orally administered to all the pregnant women. Oral misoprostol group women swallowed 3 tablets of misoprostol 200µg each 48 hours after mifepristone administration, whereas in the Vaginal misoprostol group women 3 tablets of misoprostol 200µg each were deeply inserted into vagina 48 hours after mifepristone administration. All the women were monitored for 1 hour and informed to go home. Both the groups of the pregnant women were advised to attend the hospital unless bleeding occurs. All were informed to record the onset of bleeding, timing of passage of tissue, duration of bleeding and side effects for the next 14 days. At the end of 14<sup>th</sup> day, general, vaginal examination and Ultrasound were performed to confirm complete abortion in the out-patient department. If pelvic ultrasound

showed evidence of incomplete abortion, missed abortion or continuing pregnancy, suction evacuation was done.

Outcome i.e., Complete or Incomplete Abortion, onset of bleeding (any amount of vaginal bleeding was considered as onset of bleeding), duration of bleeding, Induction - abortion interval (Induction-abortion interval was defined as the time (in hrs) between misoprostol administration and passage of products of conception) and side effects following misoprostol administration were noted as the outcome variables.

## STATISTICAL ANALYSIS

All the values were expressed as mean±standard deviation. For difference between means of different data arrays paired or unpaired two-tailed Student's t-test was performed, depending on the circumstance. Chi-square ( $\chi^2$ ) test was done for evaluation of the significance of difference in distribution of different data arrays. Differences between various parameters among different groups or subgroups were considered statistically significant if the p value was less than 0.05.

## RESULTS

The basic demographic characteristics of the pregnant women namely age (Table – 1), parity, days of gestation, history of previous mode of delivery and abortions showed no statistically significant difference between the oral and the vaginal groups.

94% women in the vaginal misoprostol group and 86% of women in the oral misoprostol had complete abortion with p-value 0.318 with no statistical significance. There was no incidence of missed abortion or continuing pregnancy in either group. There was no statistically significant difference in respect to outcome regarding parity, period of gestation, previous history of abortion and previous mode of delivery (Table – 2).

The mean induction – abortion interval was shown in table – 3. The mean induction-abortion interval in the oral misoprostol group was 3.6 (in hours) and 3.1 (in hours) in the

	Oral Misoprostol Group (n=50)	Vaginal Misoprostol Group (n= 50)	P value
Age, years	28.2 ± 5.2	27.4 ± 4.4	0.336
Parity			0.401
Primigravida	6 (12%)	9 (41%)	
Multigravida	44 (88%)	41 (82%)	
Period of Gestation, Days	44.9±6.9	44.6±7.1	0.893
≤ 49 days	39 (78%)	38 (76%)	0.812
50 – 63 days	11 (22%)	12 (24%)	
History of previous abortion			1.000
No previous abortions	44 (88%)	44 (88%)	
Had previous abortions	6 (12%)	6 (12%)	
Previous delivery			0.741
Vaginal	33 (66%)	32(64%)	
LSCS	11 (22%)	9 (18%)	

**Table-1:** Baseline Characteristics of the patients included in the study

vaginal misoprostol group.

The onset of bleeding and the duration of bleeding after misoprostol administration were almost similar in both the

	Oral Misoprostol Group (n=50)	Vaginal Misoprostol Group (n= 50)	P value
Abortion Complete	43(86%)	47 (94%)	0.318
Incomplete	7 (14%)	3 (6%)	
Parity			0.325
Complete Abortion			
Primigravida	5 (83%)	9(100%)	
Multigravida	38 (86%)	38 (93%)	
Incomplete Abortion			0.490
Primigravida	1 (17%)	0 (0%)	
Multigravida	6 (14%)	3(7%)	
Period of Gestation			0.968
Complete Abortion			
≤ 49 days	34 (87%)	37 (97%)	
50 to 63 Days	9 ( 82%)	10 (83%)	
Incomplete Abortion			0.260
≤ 49 days	5 (13%)	1(3%)	
50 to 63 Days	2(18%)	2(17%)	
History of Previous Abortion			0.869
Complete Abortion			
Past Abortions	5(83%)	6 (100%)	
No Previous Abortion	38 (86%)	41 (93%)	
Incomplete Abortion			0.490
Past Abortions	1 (17%)	0 (0%)	
No Previous Abortion	6 (14%)	3 (7%)	
Type of Previous Delivery			1.000
Complete Abortion			
LSCS	8 (72%)	8 (89%)	
Vaginal Delivery	30 (91%)	30 (94%)	
Incomplete Abortion			0.635
LSCS	3 (28%)	1 (11%)	
Vaginal Delivery	3 (9%)	2 (6%)	

**Table-2:** Treatment outcome of the drug regimens in the present study

	Oral Misoprostol Group (n=29)	Vaginal Misoprostol Group (n= 33)	P value
Induction – Abortion interval, hours	3.6 ± 1.4	3.1 ± 1.2	0.062
Induction –Abortion interval at cut-off of 4 hrs			0.029
≤4 hours	20 (69%)	30 (91%)	
> 4 hours	9 (31%)	3 (9%)	

The data depicted above refers to only those women who could definitely appreciate passage of products of conception.

**Table-3:** Effect of drug regimens on induction and abortion interval

groups (Table – 4). The onset of bleeding was 3.6 (in hours) in the oral and 3.1 (in hours) in the Vaginal group where as the duration of bleeding was found to be 9.15 and 9.14 in oral and vaginal groups. However, when analysis was done where cut off for induction to abortion was kept upto 4 hrs it was found that 91% in vaginal group had induction-abortion interval of less than 4 hours as compared to 69% in the oral group, this was statistically significant with p-value 0.029.

The incidence of nausea and vomiting was significantly higher in the oral group with 36% and 24 % and 52% and 32% in vaginal group respectively. It was found that these higher numbers of adverse events were statistically significant between these groups with p-value 0.017 (table - 3).

## DISCUSSION

Medical termination offers vast potential for improving abortion access and safety, as it requires less wide infrastructure than surgical abortion. In addition, it is devoid of anesthesia and Operation Theater, and maintains patient's need for privacy. The disadvantages would be that the women requires at least 3 visits to the hospital, erratic result in few patients, longer period of bleeding, and probable hazard of fetal deformity if it fails to cause abortion. The other factors abdominal cramps and heavy bleeding, duration of bleeding (average 7–10 days), and the need to follow-up after 2 weeks for clinical examination and sonography, prevents the women from accepting the medical termination.

Over a decade, for the medical abortion of pregnancy, anti-progestogen mifepristone followed by a prostaglandin analogue administration is in clinical practice and this combination was found to be effective up to 63 days. In a sample size of 263 pregnant women with 63 days of amenorrhoea of clinical study, resulted in a higher complete abortion rate of 95% with vaginal administration of 800mg misoprostol after pretreatment with mifepristone than the oral route with 87%.<sup>18</sup> Schaff et al have also reported that 97% absolute abortion rate with 800 mg misoprostol self-administered vaginally after pretreatment with 200 mg mifepristone at home in 933 women with pregnancy up to 8 week in their trial.<sup>19</sup> Our study also showed the similar success rates indicating both oral and vaginal routes were found to be equally effective. No statistical significance difference was observed in terms of the side effects with both the routes of administration.

A satisfactory abortion rate of 90-95% was found with the oral administration of 200mg mifepristone followed by 36-48hrs vaginal administration of 800µg misoprostol.<sup>20</sup> Due to its efficient, economical and steady at room temperature, vaginal misoprostol is widely used off label for medical

	Oral Misoprostol Group (n=50)	Vaginal Misoprostol Group (n= 50)	P value
Onset of bleeding, hours	3.6 ± 1.6	3.1 ± 1.5	0.084
Duration of Bleeding, days	9.15 ± 3.37	9.14 ± 2.34	0.084

**Table-4:** Bleeding pattern of treatment regimen in the study

abortion even it is not licensed for medical abortion.<sup>21</sup>

The comparison of pharmacokinetics of systemic bioavailability of vaginal versus oral administration indicated that the area under the serum level of misoprostol concentration versus time curve was higher than oral misoprostol.<sup>22</sup> Vaginal tablets dissolve partly, and pharmacokinetic studies have confirmed wide variability in serum levels with vaginal administration.<sup>22,23</sup>

In the present study, overall 86% of women in the oral misoprostol group showed complete abortion with complete abortion of 87% and 82% in women with gestational age  $\leq 49$  days and 50-63 days respectively. Comparable results were already reported by El-Refaey et al.<sup>17</sup> by 600 mg mifepristone followed by 800  $\mu$ g misoprostol.

With our vaginal misoprostol group, 94% had complete abortion, with abortion rates of 97% in women with gestational age  $\leq 49$  days and 83% in women with gestational age 50-63 days. Similar studies by Schaff et al<sup>19</sup> and Ashok et al<sup>20</sup> using 200 mg mifepristone but with a slightly higher dose of vaginal misoprostol of 800  $\mu$ g have shown similar results. The interval between the administration of the drug and induction of abortion has an important bearing on acceptability from the patient's perspective and overall management strategy.<sup>17</sup> In this study, mean induction-abortion interval in the oral misoprostol group was 3.7 hours and 3.1 hours in the vaginal misoprostol group which was statistically insignificant. Of the 63 women who appreciated passage of products of conception, it was seen that 81% of women had abortion within 4 hours of misoprostol administration while the rest 19% had it after 4 hours. One subject who had reported passage of product of conception had incomplete abortion. Among the 85 women who had complete abortion, 62 appreciated the passage of products of conception. In these subjects, the products of conception passed within 4 hours in 69% of those who were administered misoprostol orally while in the vaginal group 91% passed the product of conception within 4 hours. This passage of products of conception started after 4 hours in 31% in the oral misoprostol group and 9% in the vaginal misoprostol group. These differences were statistically significant [p-value (chi-square test) = 0.029]. Similar observations were noted by El-Refaey et al who found that proportion of patients who had abortion within 4 hours after the administration of misoprostol was significantly higher among those receiving the drug vaginally than those receiving it orally.<sup>17</sup>

Bleeding during and after the abortion naturally constitutes the maximum distress for both women and their care provider. The amount of bleeding considered normal during medical abortion might considerably exceed a woman's previous experience of bleeding. Passage of clots in altering sizes and amounts occurs frequently during the discharge of contents during abortion may lead the women more uncomfortable.<sup>24</sup> The mean duration of bleeding was found to be same between the oral and vaginal group. Similarly large trials found that bleeding lasts an average of 8-17 days. Rarely this can be significant requiring blood transfusion.<sup>25</sup> Dose and the route of administration of prostaglandin are the major cause

for an adverse effect during medical abortion occurs in the smooth muscle throughout the body.<sup>26</sup> Relatively higher incidence of nausea and vomiting were associated with the oral misoprostol when than the vaginal route at the same dose of administration.<sup>17</sup> Huge number of studies have been documented already with 20-65% nausea and vomiting 10-44% respectively.<sup>25,27</sup> Our study also supports the previous trials with similar patterns of adverse effects, with no statistically significant difference between the groups. El Refaey et al<sup>17</sup> also showed that the incidence of gastrointestinal side effects was higher when misoprostol was given orally than when it was given vaginally.

## CONCLUSION

Therapeutic regimen of oral administration of 200mg mifepristone followed by 600 mg misoprostol vaginal administration after 48 hours was found to be an effective and safest medical termination of pregnancy upto 63 days of gestation. Vaginal route offers early complete abortion (within 4 hours), a better profile in terms of adverse effects of nausea, vomiting, abdominal pain and diarrhea than oral route. Hence, vaginal route was found to be an effective and more acceptable method of medical termination of pregnancy as a day care procedure.

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# Frequency of Blood Group Distribution in the Donors given Blood in a Tertiary Medical Center, Kolkata, West Bengal, India

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## ABSTRACT

**Introduction:** Till now seven hundred red blood cell antigens are discovered which are organized into 30 blood groups, amongst which A,B,O and Rh groups are medicolegally important, like, blood transfusion reaction, paternity testing, legal medicine and for genetic relation with the various diseases. These groups are inherited in Mendelian fashion. So, our aim in this study was to determine the frequency of distribution of blood groups in different age groups as well as in between two sexes and at the same time to compare this frequency to the similar studies in different parts of the world.

**Materials and methods:** After proper screening procedure for exclusion of professional donors, patients with different comorbid diseases, we tested blood from 7044 people in our K P C Medical College and Hospital in the year 2013 to 2014 prior to collection. These blood were divided into A,B,O and Rh groups by forward grouping (cell grouping) and backward grouping (sera typing) by antiglobulin technique. Then these groups are tabulated according to 5 age groups between both sexes and compared with different studies throughout the world.

**Results:** Male to female ratio was 5.5:1 (5969 vs. 1075). Highest numbers of blood donors were from 21 – 30 and 31-40 age groups, both in case of males and females. Regarding the frequency of blood donation it was demonstrated that B groups were maximum followed by O, A and AB groups in both sexes.

**Conclusion:** This study will be the corner stone of innovative improvement in maintaining good data base system and improvement in blood transfusion services. This data base will prevent major transfusion reaction. It can direct the doctor regarding the possibility of certain cardiovascular and malignant diseases.

**Keywords:** Blood Group Distribution; A,B,O and Rh; blood transfusion

A, B, AB and O classifications universally. Blood groups are genetically determined inherited by Mendelian fashion and stable, hence, these are useful for paternity testing.<sup>5</sup> This novel discovery of Landsteiner opened the door of immunohematology by which later it was discovered that blood group stems are associated with severe transfusion reaction, different mortal and morbid diseases. Nearly total 700 red blood cell antigens are discovered and these are organized into 30 blood group systems by International Systems of Blood Transfusion, of which most important systems are ABO and Rh groups.<sup>6</sup> Rh group system was discovered in 1940 by Alex Wiener, Philip Levine and R.E. Stetson and ultimately this system has been proved as a major cause of transfusion reaction.<sup>7</sup> The frequency of ABO and Rh blood group systems vary according to race, ethnicity and sex.<sup>8</sup> Again, it varies from one population to another and time to time in same region. So, to provide effective management of blood banks and safe blood transfusion services, proper knowledge of ABO and Rh group distribution is necessary. Again, knowledge of distribution of these group systems is essential for the effective management as well as updation of local, regional and National transfusion services. For this, information of distribution of blood group system in any population is absolutely necessary.<sup>9</sup> This knowledge of blood group systems reduces the maternal mortality rate as well as preventable death. These systems are also essential for the following, like, population genetic studies, research of population migration pattern, resolution of certain medico legal issues especially in case of disputed paternity, searching relation with different genetic diseases. So, our aim in this study was to detect the frequency distribution of ABO and Rh blood groups and at the same time to compare with different similar studies performed in different times World-wide including our country.

## MATERIALS AND METHODS

This retrospective study was performed in K P C Medical College and Hospital only after getting clearance from

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## INTRODUCTION

Australian scientist, Karl Landsteiner discovered three blood groups A, B O in 1900 and for this he was awarded Nobel Prize in 1930.<sup>1</sup> Subsequently, Alfred Von Decastello and Adriano Studi discovered AB blood group in 1902.<sup>2</sup> In 1907 Jansky suggested Roman numerical I, II, III and IV instead of O, A, B and AB respectively. This was popular in some parts of the United States, whereas, Moss suggested similar Roman numerical as that of Jansky, but it was just reversal of later classification.<sup>3,4</sup> Moss suggested group IV for group O and I for AB, whereas, according to Jansky I is for group O and IV for AB. Moss classification was popular in United Kingdom, France and some parts of the United States. Ultimately Landsteiner in 1927 suggested using the

our local Ethical committee. This study was conducted for 2 years. Blood were collected in our hospital and different blood donation camps arranged by local clubs as well as by Corporation of Calcutta. Before taking blood proper history, examination of vital signs was performed. The persons (came for blood transfusion) with heart failure, chronic renal failure, hematological disorders, bronchial asthma, hypothyroidism, bleeding disorders, hypertension and diabetes were considered as medically unfit for donating blood during this study period. The age groups were subdivided into five age groups, like, 11-20, 21-30, 31-40, 41-50 and 51-60 years. Total male and female donors were 5969 (84.74%) and 1075 (15.26%) respectively. After collection of blood grouping was performed by two methods. One is forward grouping (cell grouping) by test tube agglutination method with the help of commercially available standard antisera A, B and D after validation from the blood bank. And the other was reverse blood grouping (serum grouping) test tube agglutination method with the help of pooled antisera A, B, D prepared daily in the blood bank. The blood group of the donor was confirmed only when forward and reverse blood grouping provided identical group report by antiglobulin techniques. All D group donors were considered as Rh positive. Then all the blood group data were tabulated, analyzed and compared with the similar studies in India as well as outside the world.

## RESULTS

Among the 7044 donors, male and female donors were 5969 (84.74%) and 1075 (15.26%) respectively. Highest number of donors were from 21-30 years age group (2731, 38.77%) followed by 31-40 years (2124, 30.15%), whereas, lowest number from 51-60 years (340, 4.82%).

Similarly, there was evidence of male preponderance as compared to females in 21-30 years (2361, 33.51% vs. 370, 5.25%) and 31-40 years (1782, 25.29% vs. 342, 4.85%). [Table 1]. In all groups, male donors were significant. In terms of ABO blood groups, highest number of donors were

S No	Age (years)	Total patients (%)	Males (%)	Females (%)
1	11-20	733 (10.44)	599 (8.50)	134 (1.90)
2	21-30	2731 (38.77)	2361 (33.51)	370 (5.25)
3	31-40	2124 (30.15)	1782 (25.29)	342 (4.85)
4	41-50	1116 (15.84)	942 (13.37)	174 (2.47)
5	51-60	340 (4.82)	285 (4.04)	55 (0.78)
	Total	7044	5969 (84.74)	1075 (15.26)

**Table-1:** Age and sex distribution in blood donors in rural areas

Blood Group	Total patients %	Total Rh+ %	Total Rh- %	Males			Females		
				Rh+	Rh-	Total	Rh+	Rh-	Total
A	1550 (22)	1505 (2.13)	45 (0.63)	1265 (17.95)	37 (0.52)	1302 (18.48)	240 (3.40)	8 (0.11)	248 (3.52)
AB	675 (9.58)	660 (9.36)	15 (0.21)	571 (8.10)	15 (0.21)	586 (8.31)	89 (12.63)	0	89 (12.63)
B	2627 (37.29)	2547 (36.15)	80 (1.13)	2166 (30.74)	73 (1.03)	2239 (31.78)	381 (5.40)	7 (0.09)	388 (5.50)
O	2192 (31.11)	2093 (29.71)	99 (1.40)	1754 (24.90)	87 (1.23)	1841 (26.13)	339 (4.81)	12 (0.17)	351 (4.98)
Total	7044	6805	239	5756	212	5968	1049	27	1076

**Table-2:** Age and sex wise distribution of blood donors

from B group (2627, 37.29%) followed by O group (2192, 31.11%), lowest being AB group (675, 9.58%). Total number of Rh positive donors was 6805 (96.61%) and Rh negative (239, 3.4%). In case of female donor, maximum were from B group (388, 5.5%) followed by O (351, 4.98%), A (248, 3.52%) and AB group (89, 1.28%) respectively. Male donors demoed similar pattern of distribution, like, B (2239, 31.78%), O (1841, 26.13%), A (1302, 18.48%) and AB group (586, 8.31%) respectively.[Table 2].

## DISCUSSION

In our study, female donors were very less as compared to male donors (male: female 5.5:1). It may be due to the following factors, like, social barrier mainly Muslim and non-educated community, cultural habit of different religions, absence of motivation to donate blood and lastly fear of blood donation as it may reduce the quantity of blood in the body. Again, most females are declared unfit due to severe anemia in case of multipara, low body weight due to frequent pregnancy or malnutrition in case of Muslims, so they are obviously excluded from donating their blood. So, health of the females should be improved with the help of nutritious diet, iron supplement and avoidance of frequent pregnancy as well as abortions. Moreover they should be motivated to donate blood making them aware of the advantages of blood donation.

In our study people of 21-40 age groups were the major donors and lowest being 51-61 age groups. Because most of the adult people suffer from diabetes, hypertension, ischemic heart disease, chronic kidney disease and these diseases prevent them from giving blood transfusion.

Frequency of blood group varies ethnically in different regions of the world. It also varies from one population to another. Frequency distribution of ABO and Rh blood grouping in different states in India and outside India were compared in table 3. In case of ABO blood grouping, prevalence of blood group B were higher in Eastern Ahmadabad (35.5%)<sup>10</sup>, Punjab(37.6%)<sup>11</sup>, Western Ahmadabad(39.4%)<sup>12</sup> and Pakistan(38%)<sup>13</sup> which was similar to our study (37.29%) and AB group being least prevalent as that of our study (9.58%). In our study, O group was second most common group (31.11%) which was similar to the study done by Eastern Ahmadabad(32.85%)<sup>10</sup>, Western Ahmadabad(30.79%)<sup>12</sup>, whereas A group was second most common group in Punjab (21.9%)<sup>11</sup> and Pakistan (23.8%).<sup>13</sup> O group was demoed as third common group in Punjab (9.3%)<sup>11</sup> and Pakistan (10%).<sup>13</sup>

On the contrary, O group were most prevalent over oth-

Area of study	Group A %	Group B %	Group AB %	Group O %	Rh+ %	Rh- %
Within India						
Shimoga-Malnad <sup>14</sup>	24.27	29.43	7.13	39.17	94.93	5.07
Davanagere <sup>15</sup>	26.15	29.85	7.24	36.76	94.8	5.52
Eastern Ahmadabad <sup>10</sup>	23.3	35.5	8.8	32.85	94.2	5.8
Punjab <sup>11</sup>	21.9	37.6	9.3	9.3	97.3	2.7
Bangalore <sup>16</sup>	23.85	29.95	6.37	39.82	94.2	5.79
Chittoor <sup>17</sup>	18.95	25.79	7.89	47.37	90.6	8.42
Vellore <sup>18</sup>	18.85	32.69	5.27	38.75	94.5	5.47
Hyderabad <sup>19</sup>	19.57	34.11	5.76	40.54	97.01	2.99
Western Ahmadabad <sup>12</sup>	21.94	39.40	7.86	30.79	95.05	4.95
Tripura <sup>23</sup>	23.77	32.8	9.64	32.95	97.06	2.94
Present study	22	37.29	9.58	31.11		
Outside India						
Pakistan <sup>13</sup>	23.8	38	10	10	89.1	10.9
Nepal <sup>25</sup>	34	29	4	33	96.7	3.33
Australia <sup>20</sup>	38	10	3	49	NA	NA
Britain <sup>21</sup>	41.7	8.6	3	46.7	83	17
USA <sup>22</sup>	41	9	4	46	85	15

**Table-3:** Comparison of frequency of ABO and Rh phenotypes in different regions in the world

er groups as demoed in the studies in Shimoga-Malnad (39.17%)<sup>14</sup>, Davanagere (36.76%)<sup>15</sup>, Bangalore (39.82%)<sup>16</sup>, Chittoor (47.37%)<sup>17</sup>, Vellore (38.75%)<sup>18</sup>, Hyderabad (40.54%)<sup>19</sup> in India and Australia (49%)<sup>20</sup>, Britain (46.7%)<sup>21</sup> and USA (46%)<sup>22</sup>.

In study done in Tripura prevalence of blood group B and O was nearly similar (32.8% in group B and 32.95 in O group).<sup>23</sup> In countries outside India, like, Nepal, A group was demoed as highest prevalent group.<sup>24</sup>

When we will consider Rh groupings, percentage of Rh positive donors were 89 to 97.25% in most of the countries of the world except in Britain and USA, where this percentage were 83 to 85 percent. This low percentage of Rh positive donors may be due to migration of people from Britain to USA.

It is well known fact that certain diseases are genetically associated with certain blood groups. Several studies in the World demonstrated a proper association of blood groups with many morbid diseases. People with group A may frequently affect from coronary heart disease, ischemic heart disease, venous thrombosis and atherosclerosis – these are of low incidence in people with group O, it may be due to presence of protective mechanism in these people.<sup>25,26,27</sup> Again, people with blood group O have 14% reduced risk of squamous cell carcinoma as well as 4% reduced risk of basal cell carcinoma and pancreatic cancer as compared to any other blood group.<sup>28,29,30</sup> Similarly gastric cancer is more prevalent in people with group A but least common in group O.<sup>31</sup> Again, female with group B are more prone to develop ovarian cancer.<sup>32</sup>

## CONCLUSION

In our study, male to female donor ratio was 5.5:1. Most of the donors were in the age group of 21 to 40 years. B group were most prevalent followed by O and A, AB being the least prevalent. It is advisable to do proper blood grouping in all

the regions of the world to maintain good database of the blood group, which will help for the following reasons, like, knowledge of blood group frequencies worldwide, future prevalence of cardiovascular diseases, certain cancers in the body (gastric, ovarian, pancreatic cancers), decrease prevalence of certain cancers in the communities (squamous cell, basal cell, pancreatic cancers), paternity testing in case of medico-legal dispute for a baby, prevention of certain inevitable disease in newborn, like, hydrops fetalis and prevention of major transfusion reaction.

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# Haemangioma of the Left Lateral Surface of Tongue, In an Adult Patient: A Rare Case Report

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## ABSTRACT

**Introduction:** Haemangiomas are rapidly growing vascular abnormalities that are benign in nature and often manifest in the neonatal period or during childhood. It is most commonly seen in the head and neck region (60-70%). It is rarely found in the oral cavity and occurrence in the tongue is even rarer. Haemangiomas in the oral cavity are always of clinical importance and require an appropriate treatment.

**Case report:** A 26-year-old male patient reported to our unit with history of swelling on the left lateral surface of tongue and difficulty in swallowing and breathing since 3 months. The patient was diagnosed to have vascular lesion after FNAC and MRI report. Patient was treated by embolisation of left lingual artery followed by surgical excision. Post op biopsy report showed the features of cavernous haemangioma.

**Conclusion:** Haemangioma continues to be used as a clinical and pathological description for many different types of vascular anomalies. The treatment modality should be planned according to the diagnosis and prognosis of the haemangioma.

**Keywords:** Haemangioma, swelling on surface of tongue, vascular abnormalities

## INTRODUCTION

Haemangioma (Greek: Haima-blood; angeion-vessel, oma-tumor) by definition can be defined as a tumor of dilated blood vessels.<sup>1</sup> Haemangiomas are rapidly growing vascular abnormalities that are benign in nature and often manifest in the neonatal period or during childhood.<sup>2,3</sup> They contribute to 7% of all benign tumors and 60-70% of these occur in the head and neck region<sup>4</sup>, with a female predilection of 3:1. It is rarely found in the oral cavity and occurrence in the tongue is even rarer. These are identified by rapid endothelial cell proliferation in early infancy, followed by involution over time.<sup>4</sup> Most true haemangiomas involute with time, but 10-20 % of them incompletely involute and require post adolescent ablative treatment. We report a case of haemangioma of the tongue in an adult male patient.

## CASE REPORT

A 26-year-old male patient reported to the Department of Oral and Maxillofacial Surgery, Army college of Dental sciences, Secunderabad India, with a chief complaint of swelling on the left side of tongue and difficulty in swallowing and breathing since 3 months. The patient's history revealed that the swelling was of peanut size when it was first noticed around 3 months back and it gradually increased to attain the present size. There was no complaint of pain, difficulty in phonation, and altered taste sensation, and he

did not give any history of trauma, bleeding or ulceration of the tongue.

History excluded any similar condition reported in any of his family members. Patient's general physical and extraoral examination was normal. On intraoral examination, there was a solitary oval-shaped swelling measuring 5 × 6 cm in size on the left postero-lateral border of the tongue partly involving dorsum and the ventral surfaces. The surface of the swelling was pinkish in colour with well defined borders. There was no ulceration or bleeding or any discharge from the tongue, and surrounding areas of the tongue were normal. Floor of the mouth was not raised. On palpation, all inspectory findings were confirmed, the lesion was soft in consistency, non-tender, compressible, non-fluctuant, no fluid thrill was present and it was not fixed to the underlying structures (Fig.1) The lesion blanched on compressing and filled again on releasing. Based on the history and clinical findings, a clinical diagnosis of vascular malformation/Haemangioma was considered. Differential diagnosis included lymphangioma, lingual varix and mucocele.

FNAC was performed which yielded about 2ml of frank blood. H and E stained smears showed blood elements, without any epithelial or stromal cells. All blood investigations were within the normal limits. MRI revealed a well defined predominantly T<sub>2</sub> hyperintensity lesion of size approximately 55x41x42 mm, (Fig.2) involving left half and posterior aspect of tongue with normal contour. Mid line shift to right because of bulging. FNAC and MRI reports confirmed the findings of a vascular lesion. Before the surgical procedure, Angiogram was performed to identify the feeding vessel and embolise the feeding vessel on the same appointment. Angiogram was carried out through the right femoral artery and both internal and external carotids were cannulated selectively. Angiogram runs were taken. Right carotid angiogram was normal whereas left external carotid angiogram showed a large tumour of the tongue fed by the left lingual artery. Left lingual artery was then selectively canulat-

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ed and embolised with gelfoam. Surgical excision of lesion was planned after 24 hours of embolization under general anaesthesia. Submandibular incision with lip split was used to access the lesion. Mandibular split osteotomy was carried out to visualise the extent of tumor. An incision was given over the lesion to completely tease out the tumor from its bed (fig.3). Osteotomy cuts were approximated and fixed using Titanium plates and screws. Closure was done using 3-0 vicryl intra-orally and 3-0 silk extra-orally. Post operative excisional biopsy confirmed the feature of cavernous haemangioma (Fig.4).

**DISCUSSION**

Hemangiomas are the most common benign tumours of the head and neck in children, but their occurrence on the tongue is extremely rare. The tongue requires special consideration because of its susceptibility to minor trauma and consequent bleeding and ulceration, swallowing difficulties, and breathing problem, although the major concern is cosmetic in most cases. The hemangiomas appear as soft mass, smooth or lobulated, and sessile or pedunculated and may vary in size from a few millimeters to several centimetres.<sup>6,7</sup> The color may vary from pink to red purple and blanching on the application of pressure is evident.<sup>8</sup> In our case the lesion was pink in color.

Hemangiomas are characterized by 3 stages: Endothelial cell proliferation, rapid growth and spontaneous involution. Monocytes are considered the potential ancestors of hemangioma endothelial cells. Vascular endothelial growth factor (VEGF), basic fibroblast growth factor (BFGF) and indole-amine 2, 3-dioxygenase (IDO), which are found in large amount during proliferative stages, are believed to be the contributing factors for growth.<sup>2</sup>

Imaging plays an important role in diagnosis, which includes Angiography, Ultrasonography, Contrast enhanced MRI, CT scans and Doppler ultrasonography, etc.<sup>8</sup> Ultrasound and MR imaging are both reasonable diagnostic tools for a suspected hemangioma.<sup>11</sup> As a non-invasive, inexpensive, and increasingly available imaging modality, ultrasonography is ideal for evaluating a suspected hemangioma that is small in size and superficial in location. MR imaging is helpful in evaluating deep or large soft tissue masses. MR imaging shows a well-margined soft tissue mass.<sup>11</sup> T1-weighted sequences show a homogeneous lesion with intermediate signal intensity during the proliferative phase, and a heterogeneous lesion with small focal areas of fat replacement during the involutinal phase.<sup>12,13</sup> On T2-Weighted images, lesions ap-

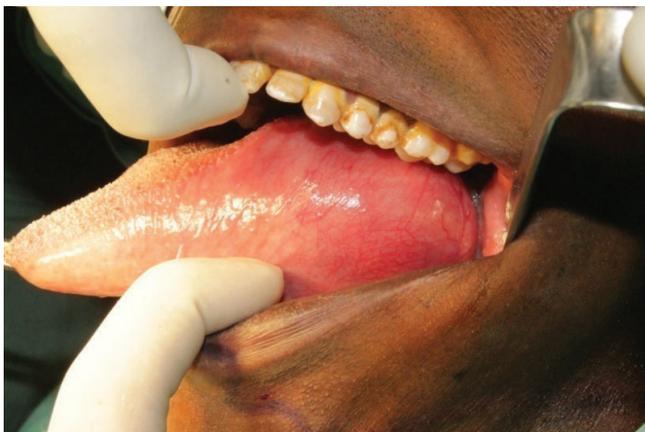


Figure-1: Swelling on the left lateral surface of the tongue

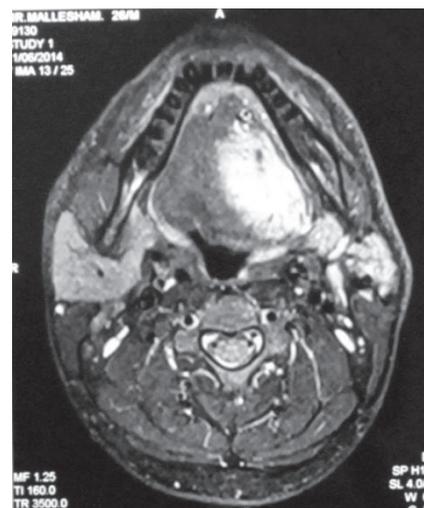


Figure-2: MRI of tongue showing the extent of lesion



Figure-3: Lesion after surgical excision

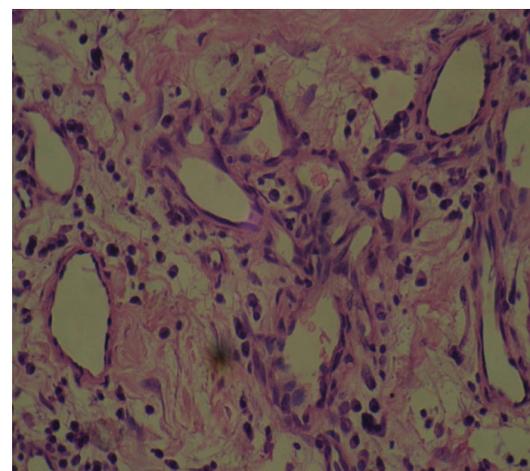


Figure-4: Histopathology showing the features of cavernous haemangioma

pear homogeneous and moderately hyperintense during the proliferative phase and more heterogeneous while involuting. Particularly deep or large lesions may require MR imaging for complete characterization.<sup>11</sup> In our case the lesion was T<sub>2</sub> hyperintensity.

The histological features are dependent on the stage of the lesion. In the proliferative phase, the lesion is highly cellular and contains plump proliferating endothelial cells and pericytes. Vascular channels are not prominent whereas, in the involutive phase, the endothelial cells are flattened, the cell turnover is normal and vascular channels filled with blood cells predominate, and the lesion is eventually replaced by fibro fatty tissue.<sup>14</sup>

In our case post operative excisional biopsy revealed a cavernous haemangioma of the tongue which showed the presence of large dilated blood sinuses, with thin luminal walls with endothelial lining.

As far as the management of these lesions is concerned, useful approach to the management of haemangiomas can be based on the stage of the lesion (proliferative or involutive phase), type of lesion (superficial, deep, compound) and the management of residual deformity.<sup>14</sup>

Various treatment modalities are present that include wait and watch policy, for spontaneous involution, intralesional and systemic corticosteroid treatment, embolization, excision, electrolysis and thermocautery, immunomodulatory therapy with interferon alfa-2a, and laser photocoagulation.<sup>9</sup> Laser energy to photocoagulate vascular lesions is also an area of interest. Currently, sclerotherapy is employed largely because of its efficiency and ability to conserve the surrounding tissues.<sup>10</sup> Resection remains the mainstay of treatment for deep haemangiomas.<sup>12</sup> In our case lesion was deep and it was obstructing the airway therefore we planned the surgical excision of lesion.

## CONCLUSION

Haemangioma continues to be used as a clinical and pathological description for many different types of vascular anomalies. Its occurrence on the posterior lateral surface of tongue is rare. Early detection and biopsy are crucial in determining the clinical behavior of the tumor and potential complications. The treatment modality should be planned according to the diagnosis and prognosis of the haemangioma.

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# A Study of Different Surgical Treatment in Otitis Media with Effusion

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## ABSTRACT

**Introduction:** "Otitis media with effusion" has been increasingly used in most of the recent literature and has become the current terminology, even though, the term effusion does not differentiate purulent and non purulent.

**Materials and methods:** It was a retrospective study of 100 patients presenting with hearing loss between the study period of one year (July 2001 to June 2002) in the Department of Otolaryngology and Head and Neck Surgery, Assam Medical College, Dibrugarh, Assam, India. Different approaches like myringotomy and aspiration, myringotomy and tympanostomy tube insertion, adenoidectomy and myringotomy and all combined.

**Results:** A gain in hearing of more than 55% was seen in all the approaches. Surgical treatment like myringotomy and tympanostomy tube insertion restore the hearing impairment immediately. The possible etiological factors like adenoid hyperplasia, infected tonsils are better cured by surgery.

**Conclusion:** The role of surgical treatment has become more important in this era of antibiotic resistant bacteria. The early diagnosis and proper treatment is of utmost value in order to prevent the harmful sequelae of otitis media with effusion.

**Keywords:** Surgical Treatment, Otitis media, myringotomy and tympanostomy

## INTRODUCTION

Otitis media with effusion is one of the most prevalent disease of ear characterized by presence of fluid in the middle ear either unilateral or bilateral with intact tympanic membrane without symptoms of inflammation. Otitis media with effusion is the commonest cause of conductive hearing loss in children. Secretory otitis media became the most generally accepted popular title which has been commonly used.<sup>1,2</sup> The criticism against this is that the assumption here of the middle ear effusion to be secretory may not always be true. Moreover "Serous Otitis Media" is incorrect because the fluid is not serum. "Glue Ear" is a good description but the fluid is not adhesive, non-purulent otitis media is considered incorrect by some because bacteria can sometimes be isolated. "Otitis media with effusion" has been increasingly used in most of the recent literature and has become the current terminology, even though, the term effusion does not differentiate purulent and non purulent. Literature and has become the current terminology. The recent concept on medical treatment for OME is that no medication has been shown a effect on cure.<sup>3,4</sup> Medication is unlikely to correct the hearing disability associated with the condition as rapidly as aspiration of middle ear contents and re-creation of ventilation tube. The failure of 20th Century Otologists to eradicate otitis

media with anti-biotic despite "adequate therapy" has led to the development of therapeutic and preventive strategies designed to disrupt the Pathophysiology of OME (Otitis Media with Effusion). These strategies include myringotomy, tonsillectomy, adenoidectomy, panostomy tube placement and even radical mastoidectomy. Surgical management of patients with otitis media with effusion is being re-evaluated for the following reasons:

- The steadily increasing incidence of the disease.
- Calling for better methods of preventive
- The dramatic emergence of multidrug-resistant bacterial pathogens
- Making judicious use of antibiotics imperative.
- The growing financial impact of the disease in today's cost-conscious climate.

We have now enough evidence based information to select patients who should benefit from surgical intervention. The role of surgical procedures has become more important in this era of antibiotic resistant environment which method of management is more expensive, surgery or prolonged medical management. More judicious use of antimicrobial agents should result when surgical operations are appropriately selected for patients they have been proven beneficial for.<sup>4,5</sup> Out of different surgical procedures myringotomy with or without grommet insertion is to be considered effective surgical treatment in the belief that prolonged middle ear effusion lead to complications and harmful sequelae.

## MATERIALS AND METHODS

It was a retrospective study of 100 patients presenting with hearing loss between the study period of one year (July 2001 to June 2002) in the, Department of Otolaryngology and Head and Neck Surgery, Assam Medical College, Dibrugarh, Assam, India. 100 patients were treated in the study period. Different approaches like myringotomy and aspiration, myringotomy and tympanostomy tube insertion, adenoidectomy and myringotomy and all combined.

The criteria for selecting the children with otitis media with

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effusion for adenoidectomy are:

- Clinical Evaluation: Obstructive Nasal Symptoms (with three sub-categories).
- Age (4-8 years): Naso-Pharyngeal airway size < 4 mm
- Radiological Evaluation

Criteria for selecting the children with otitis media with effusion for adenoidectomy and tonsillectomy:

- Bilateral documented hearing loss greater than 20 dB.
- Obstructive Nasal Symptoms.
- Recurrent attacks of sore throat and acute tonsillitis.

In the present study following surgical management options were undertaken considering the different clinical and diagnostic criteria:

1. Myringotomy and aspiration
2. Myringotomy and tympanostomy tube insertion
3. Adenoidectomy and myringotomy
4. Adenotonsillectomy, myringotomy and tympanostomy tube insertion

**Group-A: Myringotomy and Aspiration:** The Group consisted of 25 (twenty-five) cases including both adult and children with documented hearing loss of more than 20 dB, positive otoscopic findings:

**Group-B: Myringotomy and Tympanostomy Tube Insertion:** The group consisted 25 (twenty-five) cases including both adult and children with history of chronic otitis media with effusion, documented hearing loss of more than 20 dB, type B tympanogram with positive otoscopic findings.

**Group-C: Adenoidectomy and Myringotomy:** The group consisted of 25 (twenty five) cases (children under the age of 12 years) with documented hearing loss of more than 20 dB, obstructive nasal symptoms like snoring, mouth breathing with radiological evaluation of persistence of hypertrophied adenoid.

**Group-D: Adenotonsillectomy, myringotomy and insertion of tympanostomy tube:** The group consisted of 25 (twenty five) cases under the age of 12 years with documented hearing loss of more than 20 dB; with recurrent attack of sore throat, positive otoscopic findings.

All the cases were advised to perform valsalva's manoeuvre twice in a day. A mucolytic oral preparation - Bromhexidine and steroid had been added in cases of persisting effusion for more than two weeks.

Following any of the surgical procedure, in this study, a course of antibiotic had been prescribed to all cases. The cases with tympanostomy tube were advised to apply antibiotic ear drop and to avoid swimming.

In this series, major percentages of cases were children under the age of 10 years. The youngest patient was of 4 years of age and the oldest was 60 years of old. It is seen that maximum number of cases were found at the age of 7 years which constituted the peak incidence (29.75%). Most of the adults and older children complained of diminished hearing and feeling of fullness in the ear. The onset of deafness was sudden in some

of them. The fluctuating nature of deafness has been noted in patients of this series. The other common symptoms in adults were tinnitus, autophonia, itching in the ear and headache. In majority of the cases, previous history of frequent attacks of cold and upper respiratory tract infection were obtained. In this study, unilateral middle ear effusion was in major percentage (68.57%) of adults and bilateral effusion was found more commonly in children (84.61%). Maximum number of ears suspected for middle ear effusion were found to have dull, thick, opaque, grey and retracted tympanic membrane. A thin, yellow and transparent tympanic membrane with hair and air bubbles were found in some cases. Among the ears with yellow tympanic membrane, 7 ears showed the "chicken fat" texture. In 34 ears, the tympanic membrane appeared normal. Majority of dull, thick, lusterless and retracted tympanic membrane were found to be immobile. The presence of partial mobility as obtained in most of the thin, yellow and transparent tympanic membrane. 17% of tympanic membrane were distinctly mobile. In this study, Rinne Test was negative in 151 cases of which 47 being unilateral and 52 bilateral. All these ears possess the tympanic membrane appearance, audiometric findings and tympanometry in favour of otitis media with effusion.

The Rinne Test was positive in 51 ears out of which 20 ears had the clinical picture and audiometric findings of otitis media with effusion.

Out of 47 cases who had Rinne negative in one ear, the opposite ears were found to be Rinne positive in 8 cases in whom the presence of effusion was suspected. There were 5 bilaterally Rinne positive cases in whom otitis media with effusion was clinically diagnosed only on one side. The total number of ears clinically suspected for middle ear effusion was 171. The hearing loss of 20-30 dB observed in maximum number of ears 140 (70%), 35-45 dB loss in 56 ears (28.0%) and 50-60 dB in 4 ears (2%).

For the purpose of our routine pre-operative screening, both Type-A Tympanogram and Type-C Tympanogram were considered to imply a dry middle ear, and the need for surgery carefully reassessed. A flat, Type-B Tympanogram was taken to confirm the middle ear effusion. The cases with flat, Type-B Tympanograms were selected for the surgery, irrespective of the otoscopic appearance of the tympanic membrane.

## RESULTS

In a few cases with allergic history, the number of eosinophils in differential count was found to be raised. Random blood sugar level had been estimated for adult age group of patient. In this series, 25 middle ear effusions were examined microscopically and the smear shows cellular content consisting mainly of neutrophils and lymphocytes. Number of eosinophils were minimum and found in effusion of a few cases. In this study myringotomy and aspiration was performed in 25 cases in whom middle ear effusion was suspected. Myringotomy was performed for 43 ears and the effusions were aspirated through an electric suction to evacuate the affected middle ears. Myringotomy and insertion of tympanostomy

tube was performed in 25 cases (27 ears). In this study adenoidectomy and myringotomy was performed in 25 cases (44 ears) in whom the middle ear effusion was suspected in both the ears. Adenotonsillectomy, myringotomy and tympanostomy tube insertion was performed in 25 cases. Tympanostomy tube insertion was done for 32 ears. All the cases were clinically proved of presence of effusion in the middle ear, with hypertrophied adenoids and infected tonsils.

**Group-A: (Myringotomy and Aspiration):** Myringotomy and aspiration were performed for 25 cases (43 ears). 17 cases (29 ears) resolved and hearing returned to normal when checked up at 2nd and 4th weeks. During the time of operation, myringotomy revealed effusion in 20 cases (36 ears). Dry tap was encountered in 5 cases (8 ears). At the 3th week of check-up, deterioration of hearing was found in 8 cases (12 ears) with recurrence of effusion. 3 cases (6 ears) of this group did not report in the follow-up period.

**Group-B: (Myringotomy and Tympanostomy Tube Insertion):** In this series myringotomy and tympanostomy tube insertion was performed in 25 cases (27 ears). Unilateral insertion of tympanostomy tube in unilateral myringotomy was done for 8 cases (8 ears) of this series and most of them were of adult age group. Bilateral myringotomy and unilateral insertion of tympanostomy tube was done for 15 cases (15 ears) and bilateral myringotomy and bilateral tympanostomy tube insertion was done for 2 cases (4 ears). Out of 25 cases 22 cases (24 ears) were confirmed for effusion and dry tap (no effusion) in 3 cases (3 ears). All the 22 cases responded to treatment and hearing returned to normal or near-normal at the 2nd and 4th week check-up. 3 cases (3 ears) with dry tap did not report for follow-up. At the 6th and 3th week of check-up deterioration of hearing was observed in 4 cases (6 ears). 4 cases (4 ears) came with recurrence.

**Group-C: (Adenoidectomy and Myringotomy):** In this series, adenoidectomy and myringotomy was performed for 25 cases. All the selected cases were clinically confirmed for the presence of hypertrophied adenoid and middle ear effusion. Out of 25 cases (44 ears), for 16 cases (28 ears) bilateral myringotomy and for 9 cases (16 ears) unilateral myringotomy was performed. 21 cases (36 ears) responded to treatment and hearing returned to normal at the 2nd and 4th week of check-up. 4 cases (8 ears) with dry tap did not report for follow-up. At the 6th and 3th week of check-up deterioration of hearing was observed in 5 cases (8 ears). 5 cases (8 ears) came with recurrence after 3th week.

**Group-D: (Adenotonsillectomy, Myringotomy and Tympanostomy Tube Insertion):** In this series, adenotonsillectomy, Myringotomy and Tympanostomy Tube Insertion was performed for 25 cases (32

ears). All the cases were under the age group of 12 years. Out of 25 cases 24 cases (30 ears) resolved and hearing returned to normal when checked up at 2nd and 4th week. Deterioration of hearing was found in one case (2 ears). At the end of 5th week of check-up, 3 cases (4 ears) came with deterioration of hearing and recurrence.

#### **Audiometric Gain After Treatment**

**Group-A: (Myringotomy and Aspiration):** A gain of hearing upto 20 dB was achieved in 68.96%, 25-30 dB in 31.03% of ears following myringotomy and aspiration.

**Group-B: (Myringotomy and Tympanostomy Tube Insertion):** A gain of hearing upto 0dB was achieved in 55.55%, 25-30 dB in 33.33% and more than 30 dB in 11.11% of ears following myringotomy and tympanostomy tube insertion.

**Group-C: (Adenoidectomy and Myringotomy):** A gain of hearing upto 20 dB was achieved in 71.42%, 25-30 dB in 28.57% of ears following adenoidectomy and myringotomy.

**Group-D: (Adenotonsillectomy, Myringotomy and Tympanostomy Tube Insertion):** A gain of hearing upto 20 dB was achieved in 66.66%, 25-30 dB in 33.33% of ears following adenotonsillectomy, myringotomy and tympanostomy tube insertion.

In this series the total number of ears which were submitted to myringotomy was 146 out of which middle ear effusion was present in 20 ears (81.11%). There was no effusion (dry tap) in 26 ears (13.06%).

#### **DISCUSSION**

In the present study, a majority of patients had an attack of cold or upper respiratory tract infection preceding the development of otitis media with effusion. In children constituting 60% of total cases there was associated tonsillitis and adenoiditis. It seems possible from the fact that tonsil and adenoid may act as a source of infection. Middle ear effusion may be produced either by a mechanical obstruction or by post-inflammatory oedema causing obstruction of the Eustachian tube. These findings are in support of previous authors commented that adenoid should be regarded as a potential source of infection in the middle ear than causing as an obstructor to the Eustachian tube that is a contributing factor rather than a pathogenic one.<sup>1-3</sup>

Smear examination of (20 cases) showed the cellular contents pre-dominantly of lymphocytes and polymorphs, a few of moderate number of eosinophils in 9 cases. Basophils and macrophages were not seen. These findings of polymorphs and lymphocytes indicate inflammatory origin of the effusion. Senturia; Kokko E and Palva et al reported the cytological findings consisting mainly of polymorphs and lymphocytes, frequently macrophage and come to the conclusion that the middle ear effusion is of inflammatory origin.<sup>4,5,6</sup> Though otitis media with effusion is a disease of multiple aetiology and inflammatory origin is more likely in the pro-

duction of middle ear effusion.

The aetiology of otitis media with effusion remains controversial though the incidence is higher among children. However, more recent studies have drawn attention to the isolation of bacteria in 22-52% of the cases.<sup>7-9</sup> Middle ear effusion is now believed to occur as a result of post-inflammatory increase of mucous producing elements in the middle ear and accompanying dysfunction of the Eustachian tube<sup>10</sup> In this study, none of the cases following adenoidectomy or adenotonsillectomy develops complications, reported of chronic suppurative otitis media.<sup>11</sup> Two cases (2 ears) developed chronic suppurative otitis media following myringotomy and aspiration. A short-term complications such as discharging ear in 4 cases (4 ears), granulation tissue around the tympanostomy tube in one case and occlusion of tympanostomy tube in 4 cases was found in this series. No long-term complications like tympanosclerosis, atelactasis, cholesteatoma, retraction, scar or permanent perforation was found in this short duration of follow-up made in present study. Our finding in this series is in consonance with that of Brick and Mravec who reported of short term complications, that is draining ear, granulation around the tube, otitis externa, tube occlusion and perforation.<sup>12</sup> For cases with otorrhoea the discharge was sent for culture and sensitivity and oral antibiotic were prescribed according to sensitivity report. During the short follow-up made in the present study, no unwanted complications such as atelectasis, adhesive otitis media, tympano sclerosis, or cholesteatoma which occur in a long standing effusion in the middle ear did arise in the series. These complications do arise in the long term when effusion persistently present in the middle ear. During the short follow-up made in the present study, no unwanted complications such as atelectasis, adhesive otitis media, tympano sclerosis, or cholesteatoma which occur in a long standing effusion in the middle ear did arise in the series. These complications do arise in the long term when effusion persistently present in the middle ear.<sup>13</sup>

## CONCLUSION

This small piece of work is nothing, but a humble endeavour to throw a thin beam of light into the well-illuminated age old problem of otitis media with effusion in the domain of otorhinolaryngology with a keen hope to achieve something for its amelioration. As the present study encompassed within its limit only for a short period of time with a selected group of patients and a short follow-up period, the results and observations should be viewed on the above context. As such, a definite conclusion cannot be drawn. However, from the observation, it is felt that, the disease is a very common entity in otorhinolaryngological practice occurring mostly in the childhood.

The role of surgical treatment has become more important in this era of antibiotic resistant bacteria, against steadily increasing incidence of the disease, also calling for better methods of prevention which requires only well-designed and conducted studies for evidence based information to select patient who should benefit from surgical intervention.

The early diagnosis and proper treatment is of utmost value in order to prevent the harmful sequelae of otitis media with effusion.

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# Clinical Phenomenology of OCD: A Study from Kashmir

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## ABSTRACT

**Introduction:** Obsessive Compulsive Disorder is a chronic and disabling psychiatric disorder characterized by recurrent intrusive thoughts, images and impulses known as obsessions which are usually accompanied by repetitive acts or behaviors known as compulsions. The clinical presentation of this disorder has been found to be vary from one region to other; being highly influenced by social, cultural and religious factors. We aimed to study the symptom pattern of the patients presenting to our institute from Muslim majority region of Kashmir valley.

**Materials and Methods:** Our study was a cross sectional observational study. Obsessive Compulsive Disorder was diagnosed as per DSM IV TR criteria. A total of 156 patients were included in this study. Clinical phenomenology and severity were assessed using Yale Brown Obsessive Compulsive Check list and Scale respectively. Data analysis was done with the help of SPSS, version 20.

**Result:** Contamination was the commonest obsession in 55.76% patients. Religious obsessions in 25.00%, Aggressive obsessions in 21.15%, Symmetrical obsessions 20.51%, Sexual obsessions in 16.02%, Somatic in 15.38% miscellaneous in 32.69% patients were the other types of obsessions. Cleaning in 51.92%, Checking 32.69%, repeating 28.28%, counting in 6.41%, ordering in 4.48% and miscellaneous in 15.38% patients were the type of compulsions found in our study.

**Conclusion:** Contamination was the commonest obsession while as cleaning was the commonest compulsion

**Keywords:** Kashmir, Obsessive Compulsive Disorder, OCD, Phenomenology.

reflected in the kind of obsession and compulsion that area and people have. One's beliefs are largely determined by his religion.<sup>5</sup> We did this study to understand the pattern of OCD in Kashmir, a Muslim majority region in India.

## MATERIAL AND METHODS

This study was carried amongst patients attending OCD clinic of Department of Psychiatry, Institute Of Mental Health and Neurosciences Srinagar which is the lone tertiary psychiatric hospital in Kashmir and caters to whole Kashmir region, along with some adjoining areas of Jammu and Ladakh region. Ethical Committee of the institute approved the study.

**Study Design:** Our study was a non interventional cross sectional observational study.

**Patient's selection:** Diagnosis of OCD was made as per DSM IV TR criteria.<sup>6</sup> Each Patient was informed about the purpose of the interviewing. All the data of the patients including general description, demographic data was recorded in the semi structured case sheet especially designed for this study. All the new patients registered during the time period of March 2014 to May 2015 were screened and those who fulfilled the following criteria were taken up for the study.

### Inclusion Criteria

OCD as per DSM IV TR criteria.<sup>6</sup>  
OCD as primary psychiatric disorder.  
Age at least 18 years.  
Those who gave consent.

### Exclusion Criteria

1. Presence of organic brain/medical disorders.  
As a result, 156 patients were recruited.  
Patients were assessed with the help of following instruments:
  - 1) **Semi structured proforma** for recording socio demographic variables including details of chief complaints, psychiatric history and mental status examination.
  - 2) **Kuppaswamy's socioeconomic status:** This is an impor-

## INTRODUCTION

Obsessive – compulsive disorder (OCD) is a neuropsychiatric disorder, characterized by recurrent intrusive ideas, impulses, or urges (obsessions) along with overt or covert behaviours (compulsions) aimed at reducing the distress.<sup>1</sup> Reported as the one of leading cause of disability in the world by the World Health Organization (WHO), OCD causes disrupted development, social withdrawal, family and relationship problems, difficulties with concentration and academic performance.<sup>2</sup> About 2-3% of World's population suffers from OCD. There is only one epidemiological study from India. The study found lifetime prevalence of 0.6%.<sup>3</sup> About 30-50% of adult with OCD recall the onset of their symptoms beginning before the age of 18 years with males having an earlier onset than females.<sup>4</sup> Although standard nomenclature regards OCD as a unitary nosological entity, patients typically display a wide variety of obsessions and/or compulsions of varying severity. The symptomatology is influenced by social, cultural and religious factors.<sup>5</sup> People of a particular area and religion share similar concerns which are

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tant tool in hospital and community based research in India. It was proposed in 1976 and revised in 2007. This scale takes account of education, occupation and income of the family to classify study groups in to five social classes: Upper (I), Upper Middle (II), Lower middle (III), Lower lower (IV) and lower (V) socioeconomic statuses.<sup>7</sup>

**3) DSM-IV-TR diagnostic criteria for OCD:** (Diagnostic and Statistical Manual of Mental Disorders, 4th ed. Text Rev. Washington DC: American psychiatric association). Diagnostic and statistical manual of mental disorders (DSM) is the psychiatric classification developed by American Psychiatric Association in collaboration with other groups of mental health professions.<sup>6</sup>

**4) Yale brown obsessive compulsive Scale (Y-BOCS):** The scale was developed by WK Goodman et al in 1989. The scale is clinician rated, 10 item scale, each item rated from 0 (no symptoms) to 4 (extreme symptoms) with a total range of 0 to 40 and separated subtotals for severity of obsession and compulsions. The first five items concern obsessions: the amount of time they consume, the degree to which they interfere with normal functioning, the distress they cause, the patient's attempts to resist them, and the patient's ability to control them. The remaining five items ask parallel questions about compulsions.<sup>8</sup>

## STATISTICAL ANALYSIS

The data about various parameters was categorized according to age, sex, education, socioeconomic status, clinical phenomenology etc. The information thus generated was presented in tables. Statistical analysis was carried out with a commercial software package (SPSS, version 20), Appropriate statistical methods were applied and statistical significance was set at  $P < 0.05$ .

## RESULTS

Table 1 shows sociodemographic profile of patients. Majority of patients were Males, in the age group of 18 to 27 years, of rural background, belonging to nuclear families, were married, students by occupation, educated upto high classes (class 10<sup>th</sup>) and belonging to class III Socioeconomic class. As shown in table 2; contamination were the most common obsession in 55.76% patients. Religious (25.00%), Aggression (21.15%), Symmetry (20.51%), Sexual (16.02%), Somatic (15.38%) and Miscellaneous (16.02%) were the other types of obsessions. The types of compulsions were Cleaning (51.92%), Checking (32.69%), repeating (28.28%), counting (6.41%), ordering (4.48%) and miscellaneous (15.38%).

Variable	Subgroup	Frequency	Percentage	P ( Chi Square test)
Sex	Male	86	55.13	0.23
	Female	70	44.87	NS
Age distribution	18-27	67	42.95	<0.0001
	28-37	58	37.18	
	38-47	22	14.10	
	48 and above	09	5.77	
Dwelling	Rural	81	51.92	0.69
	Urban	75	48.08	NS
Family Back ground	Nuclear	81	51.92	0.69
	Joint	75	48.08	NS
Marital status	Unmarried	46	29.49	<0.001
	Married	100	64.10	
	Divorcee/Separated	10	6.41	
Occupation	Student	42	26.92	<0.001
	Unemployed	21	13.46	
	Self employed	39	25.00	
	Govt. Services	18	11.54	
	Housewife	36	23.08	
Education	Illiterate	19	12.18	<0.001
	Primary	06	3.85	
	Middle	19	12.18	
	High school	49	31.41	
	Higher secondary	34	21.79	
	Graduation	13	8.33	
	Post-Graduation and Above	16	10.26	
Socio economic Class	I	09	5.77	0.004
	II	35	22.44	
	III	53	33.97	
	IV	33	21.15	
	V	26	16.67	
Religion	Muslim	156	100	
	Others	0	0	

**Table-1:** Sociodemographic profile of patients

Mean age of patients was 29.58 years while as mean age of onset of OCD was 22.6 years as shown in table 3.

As shown in table 4; the severity of OCD which was assessed by YBOCS scale shows most patients (32.69%) having Mild variety of OCD while as only 4.49% patients had extreme OCD.

## DISCUSSION

This is the first study from Kashmir on OCD, a heterogeneous disorder characterized by a wide variety of symptoms. The difference in symptom pattern of OCD is only speculative and no definite reason is provided for the same. We undertook this study to analyse the symptom pattern that OCD patients present to our hospital.

A total of 156 patients were included in our study. Sex ratio was tilted slightly towards the male gender with 55.13% (86) males and 44.87% (70) females comprising the whole sample. There are other studies, which have slightly greater percentage of males as compared to females in their respective studies.<sup>9-11</sup> The male preponderance is explained due to the socio-cultural taboos, prevalent in conservative society like Kashmir, in which women feel hesitant to consult a doctor especially a psychiatrist.

The majority of the patients belonged to young and the middle age groups. Mean age of patients was 29.58 years and mean age of onset of OCD was 22.6 years. This is in agreement with Khanna et al who reported 29.5 years as mean age of assessment.<sup>10</sup> Most of Indian studies report similar results.<sup>9,11-13</sup>

While the percentage of different symptoms varies widely between different studies, their frequency with regard to pattern is somewhat broadly uniform. Contaminations predominate the kind of obsessions with 55.76 % among patients in our study. Contaminations predominated the obsession pattern in most Indian studies<sup>9,11,13</sup> except study by Mahajan et al<sup>12</sup> who found aggressive obsessions to be commonest. Our study is fairly consistent with The Brown Longitudinal Obsessive Compulsive Study by Pinto et al<sup>14</sup> (who reported 57.5% contamination obsession in adults). In our study, obsessions of contamination were followed by religious (blasphemous) obsessions. Our results match those of Rahman MH and Kamal AHMKM<sup>15</sup> in Bangladesh and of Rady et al<sup>16</sup> in Egypt, two Muslim majority areas like Kashmir with regard to type of obsession as in both studies religious obsessions followed contamination obsessions in terms of type of obsession. Muslims have to pray five times every day and observe one month of fasting (Ramadhan) during day hours unlike other religions which could possibly explain for higher prevalence of religious obsession in Muslims and hence our study. Symmetrical, sexual and somatic obsessions are less prevalent obsessions as compared to other types of obsessions which is in accordance with studies done in different parts of the world.<sup>9,11,13-15</sup> Miscellaneous obsessions formed about 34.78% of total patients. These include musical obsessions, intrusive images or words, need to know certain numbers and mathematical figures etc.

In our study, cleaning was the commonest compulsion fol-

Symptom (S)	Frequency	Percentage
Obsession		
Contamination	87	55.76
Religious	39	25.00
Aggression	33	21.15
Symmetry	32	20.51
Sexual	25	16.02
Somatic	24	15.38
Miscellaneous	51	32.69
Compulsion		
Cleaning	81	51.92
Checking	51	32.69
Repeating	44	28.28
Counting	10	6.41
Ordering	7	4.48
Miscellaneous	24	15.38
More than one obsessions /compulsion were present in some patients.		

**Table-2:** Phenomenology of OCD among patients

Variable	Mean ( in years)	SD	Range
Age at assessment	29.58	9.72	50 (18-68)
Age at onset	22.60	6.65	32 (43-11)

**Table-3:** Mean age of assessment and Onset of OCD

YBOCS score	Severity	Number of Patients	%
8-15	Mild	51	32.69
16-23	Moderate	48	30.77
24-31	Severity	50	32.05
32 and above	Extreme	7	4.49
Total		156	100

**Table-4:** Severity of OCD as per YBOCS score

lowed by Checking. Cleaning was reported to be most common compulsion in studies by Parmar MC and Shah NP<sup>9</sup> and Khurana et al<sup>11</sup> and second common by Mahajan et al<sup>12</sup> and Khandelwal et al.<sup>13</sup> Checking predominates most of the Western studies<sup>17,18</sup> and some Indian studies like Mahajan et al<sup>12</sup> and Khandelwal et al.<sup>13</sup> Counting and ordering are least common compulsions which was also found in our results. This is in accordance with Indian as well as Western.<sup>9,11-14,17,18</sup> Our study did not have any case of hoarding. Indian studies<sup>9,11-13</sup> have reported hoarding to be the least common OCD pattern as compared to western studies reflecting a markedly lesser prevalence as compared to Western studies<sup>14,17,18</sup> which have found higher percentage of hoarding.

### Limitations our study

There were biases of referral pattern and selection criteria. Patients were recruited from single treatment centre only, so the degree to which the results can be generalised to other cohorts of OCD patients is uncertain. Also, OCD pattern may change overtime, which we didn't assess owing to the design of our study.

## CONCLUSION

Contamination was the commonest obsession followed by religious obsession while as cleaning was the commonest

compulsion followed by checking compulsion. Kashmir culture differs from rest of India, that could affect the symptomatology of OCD in Kashmir valley. Further, studies need to be undertaken on this subject.

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# Early Versus Delayed Deworming in Cases of Roundworm Intestinal Obstruction in Pediatric Population –Experience from a Tertiary Care Centre in the Kashmir Valley

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## ABSTRACT

**Introduction:** Small bowel obstruction is the most common complication of roundworm (*Ascaris lumbricoides*) infestation commonly affecting the pediatric age group. This is a prospective randomised study comparing results of early deworming in children with roundworm induced small bowel obstruction with that of delayed deworming during the course of admission.

**Material and Method:** From January 2013 to June 2015, 255 patients of acute intestinal obstruction due to ascariasis were admitted. Exclusion criteria included children above 15 years or below 6 months of age, history of surgical intervention or any neurological disorder, clinical features of peritonitis, shock and clinical or radiological evidence of any cause of obstruction other than ascariasis. Children included were randomized into early deworming group (EDG) and delayed deworming group (DDG). Cases in EDG were managed by nasogastric suction, parenteral fluid resuscitation, deworming at the time of admission with Albendazole followed by first distal enema after 6 to 8 hours. In delayed deworming group (DDG), deworming was withheld until obstruction was relieved with nasogastric decompression and distal enemas every 6 to 8 hours or due to surgical interventions.

**Results:** Out of 255 admitted children, 252 (138 males and 114 females) were included in the study; 3 children proved to have causes other than worm obstruction were excluded. Mean age was 5.8 years and mean follow-up was 17 months. The two groups (EDG = 123, DDG = 129) were comparable in age, sex and symptoms and signs at the time of presentation. Mean time to the first feed was significantly reduced in EDG as compared to DDG (20.18 ± 11.21 hours vs 49.37 ± 9.45 hours; *p* value < 0.05).

**Conclusion:** Contrary to belief that early deworming during hospital admission increases the incidence of obstruction, the same does not hold true in practice. Early deworming should be encouraged as it decreases the morbidity, cost and the hospital stay significantly with no significant increase in the incidence of complications.

**Keywords:** Ascariasis, Deworming, Roundworm obstruction, Albendazole

emergency.<sup>3-9</sup> Most of the worm obstructions are managed conservatively with close monitoring for the development of severe complications. The conservative management in uncomplicated worm obstruction includes restricting oral feeding, nasogastric suction, repeated enemas, fluid resuscitation, electrolyte replacement, antibiotic coverage and analgesics.<sup>8-13</sup> Deworming by anthelmintic agents during the course of admission for acute roundworm obstruction has been controversial.<sup>8-11</sup> We present our experience with management of acute roundworm intestinal obstruction in children by comparing the results of deworming early in the course of admission with that of delayed deworming, a prospective study over two and a half years.

## MATERIAL AND METHODS

From January 2013 to June 2015, 225 patients of acute intestinal obstruction due to ascariasis were admitted in one among six surgical units of Government Medical College Srinagar, Kashmir. All children diagnosed on clinico-radiological evidence were included in the study after permission from the hospital ethical committee. Exclusion criteria on admission included children above 15 years or below 6 months of age, history of surgical intervention or any neurological disorder, clinical features of peritonitis, shock and clinical or radiological evidence of any cause of obstruction other than ascariasis. Any patient initially included in the study as roundworm obstruction was later excluded if the cause proved other than intestinal ascariasis or if contributing causes of obstruction were present.

Colicky abdominal pain, abdominal distension, localized or diffuse abdominal tenderness, vomiting with or without worms in the vomitus, palpable worm masses, and empty rectum on digital rectal examination were the main clinical features. Abdominal radiography and ultrasonography con-

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## INTRODUCTION

Roundworm infestation (ascariasis) has plagued mankind since times immemorial and the valley of Kashmir, the heaven of ascariasis, is no exception. Intestinal obstruction is the commonest surgical complication of ascariasis, especially in children.<sup>1-13</sup> In Kashmir ascariasis related complications account for 50 to 60 percent of admission in pediatric surgical

firmed worm masses causing signs of bowel obstruction. Two groups were assigned by randomization using lottery method, with written consent from parents after explaining in detail the option of the treatment. All the patients in early deworming group (EDG) were managed by nasogastric suction (in cases of significant bowel distension and/or vomiting), parenteral fluid resuscitation, deworming at the time of admission with Albendazole suspension (Zentel®, 400 mg/10 ml, GlaxoSmithKline, India) followed by first distal enema after 6 to 8 hours. Albendazole suspension (400 mg above 2 years and 200 mg below 2 years of age, respectively) was given either orally or instilled through nasogastric tube. In delayed deworming group (DDG), deworming was withheld until obstruction was relieved with nasogastric decompression and distal enemas every 6 to 8 hours or due to surgical interventions. Surgical intervention was done if obstruction was not relieved by conservative management for 96 hours or earlier in case of deterioration in clinical condition, warned by tachycardia, tachypnea, fever, abdominal tenderness, and vomiting. All the patients who were discharged were followed at least for 6 months. Deworming was repeated at 3 months in every patient.

Outcome measures to compare the results included time taken, in hours, from admission to first oral feed (started on passage of flatus, stool and/or worms), total hospital stay and the surgical intervention needed in each group.

## STATISTICAL ANALYSIS

Data were prospectively entered into SPSS software. Student's *t* test and  $\chi^2$  test were used for data analysis. *P* value of < 0.05 was considered significant.

## RESULTS

Table 1 compares the results in two groups in terms of the outcome measures. Out of 255 children admitted as worm induced small bowel obstruction, 252 (138 males and 114 females) were included in the study; 3 children proved to have causes other than worm obstruction were excluded. All the patients were aged between 6 months and 15 years (mean 5.8 years). The two groups (EDG = 123, DDG = 129) were comparable with regard to age, sex and symptoms and signs at the time of presentation. Mean follow-up was 17 months. The mean time taken from admission to the first oral feed started was found significantly reduced in EDG as compared to DDG (20.18 ± 11.21 hours vs 49.37 ± 9.45 hours; *p* value < 0.05). The mean hospital stay was 30.54 ± 10.31 hours in EDG and 74.59 ± 6.7 hours in LDG. The difference was statistically significant (*p* value < 0.05). Out of 123 patients in the early deworming group, 8 patients required surgical intervention; 3 patients required enterotomy for retrieval of

worms and in other 5 milking of worms was done. In delayed deworming group (n = 129), 11 patients required surgical intervention; enterotomy in 6; milking of worms in 4 and one required resection and anastomosis of gangrenous gut. Three patients which were earlier included as cases of worm obstruction were later excluded. One with paraduodenal hernia was from EDG and the other two with congenital terminal ileal bands in association with worm obstruction were from DDG. The difference between surgical interventions in two groups was not statistically significant (*p* value > 0.05).

## DISCUSSION

*Ascaris lumbricoides* (roundworm) is the largest and most prevalent of the human helminths and is more prevalent in tropical and subtropical climates. In Southeast Asia, 42 to 92% of the population is infested.<sup>11</sup> Ascariasis can cause serious intra-abdominal complications such as intestinal obstruction, biliary obstruction, cholangiohepatitis, liver abscess, pancreatitis, acute appendicitis, intestinal perforation, and granulomatous peritonitis.<sup>6-19</sup> Luminal obstruction is the most common complication of round worm infestation and more so in children attributable the narrower intestinal lumen.<sup>7,10</sup> The obstruction is caused by an entanglement of worm boluses and spasmodic contraction of the small bowel on to a mass of worms with effectual obstruction at the ileo-cecal valve, augmented by inflammation and matting of loops of the bowel at the site occupied by worms.<sup>11</sup> This can lead to severe sequelae like volvulus, intussusception, gangrene etc.<sup>10-14</sup>

Most of the children with round worm induced bowel obstructions respond to the conservative management with surgical management reserved for complicated cases.<sup>8-13</sup> Keeping the child nil by mouth for a longer time, while on intravenous fluid therapy, is believed to starve the worms resulting their disentanglement and passing down as smaller non-obstructive boluses.<sup>7-10</sup> Hypertonic saline enemas are then used to expel them from the colon.<sup>7-13</sup> Water soluble contrast orally or through nasogastric tube has been successfully used to disentangle worm boluses utilizing its hygroscopic and lubricating features.<sup>20,21</sup>

Early deworming during the course of admission has remained a controversial subject due to available reports that it can exaggerate obstruction. Some authors believe that using antihelminthic agents during the course of conservative management alters the motility of the worms and hampers their clearance leading to serious complications like intussusceptions, volvulus, haemorrhagic or necrotic bowel and even perforation.<sup>22,23</sup>

We studied deworming early at the admission based on the hypothesis that movement of worms down the lumen is only passive rather than active. This forms the basis for de-

Outcome measures	Early deworming group (EDG) n=123	Delayed deworming group (DDG) n=129	Mean difference	P value
Mean time (in hours) from admission to first oral feed	20.18 ± 11.21	49.37 ± 9.45	29.19	<0.05
Mean hospital stay (in hours)	30.54 ± 10.31	74.59 ± 6.7	44.05	<0.05
Surgical intervention needed	8	11	3	>0.05

**Table-1:** Comparison between outcome measures in two groups.

worming in all cases of worm infestations. Worms can be pushed down by peristalsis only when paralysed or dead. Also worms cannot be washed down by enemas unless they reach the colon. We used Albendazole with a purpose to induce flaccid paralysis followed by the death of the round worms. Albendazole acts upon microtubules in cytoskeleton and block the transport secretory granules and movements of other sub-cellular organelles leading to flaccid paralysis followed by death secondary to decreased ATP production. The dead worms slip off from the worm bolus one by one forming smaller boluses which can negotiate the intestinal lumen with ease and thus relieving the obstruction. We did not use Piperazine citrate for its disrepute to cause toxicity leading to its removal from the markets in developed countries.<sup>24</sup> A time gap of about 6 to 8 hours between ingestion of deworming agent and the enema allows the paralysed or dead worms reach the colon to be effectively washed by the enema fluid. The benefits of early deworming in our study, contrary the earlier belief,<sup>22,23</sup> can be explained by exploiting the effective peristalsis struggling against obstructing worm boluses while getting worms paralysed/killed early in the course of admission. Living round worms continue to stay in the small bowel against the peristalsis and can be expelled only when pushed down into the colon. Also delayed oral feeds in late deworming cases potentially can increase the chances of hypokalemia and, hence, decrease in peristalsis. Prolonged wait also, theoretically, can exhaust the small bowel enough and reduce the effective peristalsis.

## CONCLUSION

Round worm infestation is the commonest cause of small bowel obstruction in endemic areas like Kashmir valley. Early deworming in the course of admission with Albendazole relieves the obstruction early and allows early oral feeding and discharge from the hospital. This, in turn, decreases the morbidity and loss of school days in the patients, bed occupancy in the hospitals and economic burden on the society. On the basis of this comparative study, we recommend early deworming during hospital admissions followed by deworming at regular intervals of three to six months.

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# Comparison of Effect of Ondansetron VS Palonosetron in Prevention of Postoperative Nausea and Vomiting Following Laparoscopic Surgery

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## ABSTRACT

**Introduction:** Palonosetron is a new second-generation selective 5-hydroxytryptamine type 3 receptor antagonists that reportedly has more potent antiemetic effect. Present study was undertaken to compare the efficacy of Palonosetron in the prevention of postoperative nausea and vomiting (PONV) with that of Ondansetron in patients undergoing laparoscopic surgery.

**Material and Methods:** In this prospective study, 50 healthy patients who were undergoing laparoscopic operation were divided into two groups: The Palonosetron group (0.075 mg i.v.; n=25) and the Ondansetron group (8 mg i.v.; n=25). The treatments were given 30 minutes before the end of surgery. The incidence of PONV, severity of nausea, and the use of rescue antiemetic requirements during the first 24 h after surgery were evaluated as two groups (0-6 hours and 6-24 hours).

**Results:** The incidence of nausea in the first 6 hours after the surgery in the Palonosetron and Ondansetron groups was 4% and 20% respectively, which was statistically insignificant whereas late nausea (6-24 hrs.) was 12% and 40% which was statistically significant. 2 patients in the Ondansetron group and none in the Palonosetron group had vomiting during the first 6 hours, which was statistically insignificant, whereas none in the Palonosetron group and 32% of patients in Ondansetron group had vomiting during the late postoperative period of 6-24 hours which was statistically significant.

**Conclusions:** Palonosetron 0.075 mg i.v. was found to be more effective than Ondansetron 8 mg i.v. in prevention of PONV in the 6-24 hours' period after the Laparoscopic surgery.

**Key Words:** Post-operative, Nausea and Vomiting, Palonosetron, Ondansetron, Laparoscopic surgery

## INTRODUCTION

Postoperative nausea and vomiting is one of the most common and distressing side effect encountered by patients following anesthetic and surgical procedures. In the present scenario, it is estimated that 20 to 30% of adult patients develop postoperative emesis<sup>1</sup>, which is consistently lower when compared to 75 to 80% reported during the ether era. Incidence of postoperative nausea and vomiting ranges from 25 to 55% following inpatient surgery and 8 to 47% for outpatient surgery. When questioned before surgery, it was observed that patients were concerned about postoperative nausea and vomiting apart from pain and often rate it worse than postoperative pain.<sup>2</sup> Severe and persistent postoperative nausea and vomiting can cause tension on suture lines, bleeding at operative sites and wound dehiscence, venous hypertension, esophageal tears and rupture, rib fractures,

gastric herniation and muscular fatigue.<sup>3</sup>

In neurosurgical cases, postoperative nausea and vomiting can cause increased intracranial tension. It can also increase the risk of pulmonary aspiration. It may result in dehydration and electrolyte imbalance in pediatric population. Postoperative nausea and vomiting is a major contributor to burgeoning health care costs for both the hospital and the patient. These costs may result from longer recovery, extended stay in the hospital, added attention required from nurses and physicians, additional drug supplies as well as unanticipated admissions following outpatient procedures.<sup>4,5</sup> Most of the currently used antiemetic drugs like antihistaminic, anticholinergics and dopamine receptor antagonists possess clinically significant side effects.<sup>6</sup>

Palonosetron<sup>7-10</sup> is a new second generation selective 5-hydroxytryptamine type 3 (5HT<sub>3</sub>) receptor antagonist that reportedly has more potent antiemetic effects compared with other 5HT<sub>3</sub> receptor antagonists. The purpose of this study was to evaluate the efficacy of Palonosetron for the prevention of postoperative nausea and vomiting (PONV) with that of Ondansetron in patients undergoing laparoscopic surgery. The aim of the present study is to compare the effectiveness of intravenously administered Palonosetron and Ondansetron in the prevention of postoperative nausea and vomiting in patients following laparoscopic surgery under general anesthesia.

## MATERIAL AND METHODS

The study was approved by the hospital ethics committee and written informed consent was obtained from patients. A total number of 50 patients in the age group of 26 to 55 years belonging to ASA Grade I and ASA Grade II undergoing laparoscopic surgery under general anesthesia were selected for the present study. They were randomly divided into two groups, Group A and Group B, each consisting of 25 pa-

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tients. Group A received 0.075 mg of Palonosetron i.v. and group B received 8 mg of Ondansetron i.v., 30 minutes before the reversal of anesthesia.

### Selection of patients

#### A) Inclusion criteria

- 1: Patients of ASA Grades I, and II.
- 2: Patients between the age group of 26 to 55 years.

#### B) Exclusion criteria

- 1: Patients belong to ASA Grade III, IV and V.
- 2: Patients below the age of 26 years.
- 3: Patients above the age of 55 years.
- 4: Patients with a history of hypersensitivity to Ondansetron or Palonosetron and those with a history of motion sickness.
- 5: Patients with recent or chronic ingestion of any other medicine with potential antiemetic properties.
- 6: Patients with clinically significant cardiovascular, pulmonary, renal, hepatic, neurological or endocrine abnormalities.

Preoperative visit was conducted on the previous day of surgery and a detailed history and present complaints were noted. General and systemic examinations of cardiovascular, respiratory and central nervous system were done. Routine laboratory investigations like complete haemogram, blood urea, serum creatinine, and blood sugar, ECG, bleeding time and clotting time were done. Preoperative data collected included age, weight, heart rate, blood pressure, history of motion sickness, previous surgery and PONV. Patients were instructed to remain nil orally after 10 PM on the previous night of surgery.

Every effort was made to standardize the anesthetic technique. General anesthesia with controlled ventilation was used in all patients. Preoperative pulse rate, blood pressure and peripheral oxygen saturation were recorded in the operation theatre after connecting the following monitors:

1. Continuous electrocardiogram
2. Sphygmomanometer
3. Pulse oximeter

Peripheral venous access was established and intravenous fluid was started. The patients were premedicated with Inj. Glycolpyrolate 0.004mg/kg, Inj. Midazolam 0.2mg/kg, Fentanyl 2mcg/kg, all through intravenous routes, just before induction as patients were preoxygenated for 3 minutes before induction of anesthesia with Inj. Propofol 2 mg/kg. Inj. Succinylcholine 2mg/kg was used as muscle relaxant for intubation with appropriate size endotracheal tube. Inj. Vecuronium 0.08 mg/kg i.v. followed by one fifth of loading dose were used to provide muscle relaxation during surgery. Maintenance of anesthesia was with nitrous oxide (66%) and oxygen (33%) with Sevoflurane (0.5-1%) using controlled ventilation through closed circuit to maintain an  $ETCO_2$  of 30-35 mm Hg. Patients were monitored during anesthesia using continuous ECG, heart rate, blood pressure,  $ETCO_2$  and pulse oximetry. 30 minute before the completion of surgery, antiemetic medication was administered. On comple-

tion of surgery, the residual paralysis was reversed with Inj. Neostigmine 0.05 mg/kg i.v. and Glycolpyrolate 0.008 mg/kg i.v. and after complete recovery patients were extubated. Patients were transported to the recovery room and later to the ward after confirming an adequate level of consciousness and intact reflexes. The patients were observed for 24 hrs. postoperatively for nausea, retching and vomiting. Rescue antiemetic were given if vomiting occurred more than once, for nausea lasting more than 10 minutes or at patient's request. Inj. Diclofenac 1.5 mg/kg i.m., were administered to patients who complained of pain.

The incidences of PONV were recorded within the first 24 hours after surgery at intervals of 0-6 hours, and 24 hours. Episodes of PONV were identified by spontaneous complaints by the patients or by direct questioning. Incidence of nausea and vomiting occurring in first six hours is considered as early nausea and vomiting and incidence of PONV after six hours was considered as late emetic episode.

“Complete response” was defined as the absence of nausea, retching or vomiting and no need for rescue antiemetic during the 24-hour observation period. Rescue antiemetic was provided with Inj. Metoclopramide 10mg i.v. in the event of 1 or more episodes of vomiting depending on the observer's discretion.

We made no distinction between vomiting and retching (ie., retching event was considered a vomiting event). Nausea and vomiting were evaluated on three-point ordinal scale. 0 = none, 1 = nausea, 2 = retching or vomiting. The incidence of nausea and vomiting in the two different groups was analyzed using Chi-square test,  $p < 0.05$  was considered significant.

## RESULTS

A total number of 50 cases were taken into study. 25 of them received Palonosetron 0.075 mg, and the other 25 patients received Ondansetron 8mg for preventing postoperative nausea and vomiting through a period of 24 hours. All the patients completed the study. There were no statistically significant differences between the groups with respect to patient characteristics, type of surgery and duration of anesthesia. (Table-1)

The incidence of postoperative nausea and vomiting in 24-hour period was 12% and 48% in Palonosetron and Ondansetron respectively. (Table 2 chi-square = 7.8095,  $df = 1$ ;  $P (0.01) = 6.63$ ). The incidence of retching/vomiting in first 24 hours' postoperative period was 32% in Ondansetron group and no such episodes occurred with Palonosetron. (Table 2- chi-square = 9.6726;  $df = 1$ ,  $P (0.01) = 6.63$ ). Incidence of early nausea (0-6 hours) in Palonosetron and Ondansetron were 4% and 20% which was statistically insignificant ( $p$  value  $> 0.05$ , table 3) whereas late nausea (6 – 24 hours) is 12% and 40% respectively which was statistically significant. ( $P$  value  $< 0.05$ , table 3).

It was observed that 2 patients in Ondansetron and none in Palonosetron had vomiting during first 6 hours of postoperative period. There were no statistically significant differences

Patient characteristics	Mean Group A	Mean Group B	SD Group A	SD Group B	p value
Age	40.5200	39.8400	8.7088	7.4424	0.2968 NS
Weight	50.3600	48.1600	5.8158	6.7186	1.2379 NS
Duration of anesthesia (min)	100.0000	89.0000	26.6145	23.6291	1.5454 NS
Duration of surgery (min)	91.2000	99.2000	17.3973	25.1529	1.3079 NS
Group A – Palonosetron; Group B – Ondansetron					

**Table-1: Demographic and anesthetic data**

PONV	Group A (Palonosetron)	Group B (Ondansetron)
Present	3 (12%)	12 (48%)
Absent	22 (88%)	13 (52%)
Total	25	25

**Table-2: Incidence of postoperative nausea and vomiting (ponv) in first 24 hours**

	Palonosetron		Ondansetron	
	Early	Late	Early	Late
Nausea Present	1	3	5	11
Absent	24	22	20	14
Total	25	25	25	25

**Table-3: Incidence of early nausea(0-6 hours) and late nausea (6-24 hours)**

Vomiting	Palonosetron		Ondansetron	
	Early	Late	Early	Late
Present	0	0	2	8
Absent	25	25	23	17
Total	25	25	25	25

**Table-4: Incidence of early (0-6 hours) and late (6-24hours) vomiting**

es between the two groups ( $p > 0.05$  Table-4). There were no emetic episodes during 6-24 hours' postoperative period in Palonosetron group whereas 32% of patients in Ondansetron group developed emesis during this late postoperative period, which showed statistically significant difference ( $p < 0.05$  Table 4).

*The incidence of postoperative nausea and vomiting in 24 hours' period* was 12% and 48% in group A and Group B respectively. Chi Square = 7.8095, Degree of freedom = 1,  $P(0.01) = 6.63$  (Table value of  $X^2$  at 0.01 level of significance). The incidence of nausea in first 24 hours of postoperative period was significant in Group B compared to Group A. Chi Square = 7.8095, degree of freedom = 1,  $P(0.01) = 6.63$ . (Table value of  $X^2$  at level of significance).

*Incidence of vomiting in first 24 hours of Postoperative Period:* There were no emetic episodes in Group A. Incidence of emetic episodes in Group B is 32%. Incidence of emetic episodes in 24 hours of postoperative period is significantly high in group B compared to group A ( $p < 0.01$ ). Chi square = 9.6726, degree of freedom = 1,  $P(0.01) = 6.63$ . (Table value of  $X^2$  at 0.01 level of significance).

*Incidence of early nausea (0-6 hours)* in Palonosetron group and Ondansetron groups did not show any statistically significant difference. ( $P$  value  $> 0.05$ ). Chi-square = 3.219, degree of freedom = 1,  $P$  value (0.05) = 3.84. (Table value of

$X^2$  at 0.05 level of significance).

*Incidence of late nausea* was 12% and 40% in Ondansetron and Palonosetron groups respectively, which was statistically significant difference. Chi square = 5.1975, degree of freedom = 1,  $P$  value (0.05) = 3.84 (Table value of  $X^2$  at 0.05 level of significance).

Both Palonosetron and Ondansetron were equally efficacious in preventing vomiting during early postoperative period after recovering from anesthesia ( $p$  value  $> 0.05$ ). Chi square = 2.602, degree of freedom = 1,  $P$  value (0.05) = 3.84 (Table value of  $X^2$  at 0.05 level of significance). There were no emetic episodes during 6-24 hrs. postoperative period in Palonosetron group whereas 32% of patients in Ondansetron group developed emesis during this late postoperative period, which showed statistically significant difference. Chi square = 9.6726, degree of freedom = 1,  $P$  value (0.05) = 6.63. (Table value of  $X^2$  at 0.05 level of significance).

## DISCUSSION

In spite of so many advances in the management of postoperative nausea and vomiting with the invention of new drugs, multimodal approaches of management like administering multiple different antiemetic medication, less emetogenic anesthetic techniques, adequate intravenous hydration, adequate pain control, etc., the incidence of postoperative nausea and vomiting remains still high ranging from 25%-55% following inpatient surgery and 8%-47% following outpatient surgery.

Unfortunately, commonly used medications like antihistamines, anticholinergics, gastroprokinetic, butyrophenones, can cause undesirable side effects like sedation, dysphoria, restlessness and extrapyramidal symptoms. To overcome these, serotonin antagonists like Ondansetron, Tropisetron, Dolasetron, Granisetron, Ramosetron and Palonosetron were introduced for treatment of nausea and vomiting. They were primarily used in treating chemotherapy induced vomiting with minimal and clinically acceptable side effects. We compared most commonly used antiemetic Ondansetron with its newer congener, Palonosetron, a promising addition to the world of antiemetic.

In the present study, the antiemetic efficacy of Ondansetron and Palonosetron were assessed in first 24 hours of postoperative period divided into two groups of assessment period (0-6 hrs., early postoperative period and 6-24 hours, late postoperative period) to assess the efficacy of both the drugs during different time intervals. We have selected similar groups of patients in respect of age, weight, duration of surgery and duration of anesthesia to compare the efficacy of the drugs. Analgesia for postoperative pain was standardized

and patients of both groups were observed for a period of 24 hours postoperatively. Hence we believe that the difference in postoperative nausea and vomiting is attributed exclusively to the study drugs.

Unlike Kim et al (2009), we have not included the placebo group in our study for want of approval from hospital ethics committee as the incidence of postoperative nausea and vomiting is very high in our set up without prophylactic antiemetic.

Although Ondansetron 4 or 8 mg has been recommended for preventing PONV, the meta-analysis by Ryu et al suggested that an 8 mg dose of Ondansetron was optimal for prevention of PONV. Therefore, Ondansetron 8 mg was chosen for this study. Palonosetron is a newly developed 5HT<sub>3</sub> receptors antagonist with a more potent and longer receptor antagonizing effect compared with older 5HT<sub>3</sub> receptors antagonists. In addition, the elimination half-life of Palonosetron is (40h). According to Park SK, Cho EJ, Kang SH, Lee YJ, Kim DA. Palonosetron is effective in preventing PONV after gynecological laparoscopic surgery and Palonosetron 0.075mg is an effective dose for preventing PONV. The manufacturer's recommended dose is 0.075mg i.v. once a day. Therefore, Palonosetron at 0.075 mg dose was chosen for this study.<sup>11</sup>

Our study agrees with and confirms the various aspects of the above studies in most of the aspects. We found that Palonosetron has a definite advantage over Ondansetron in the prevention and treatment of postoperative nausea and vomiting in patients following laparoscopic surgery under general anesthesia. There was absolutely negligible need for rescue antiemetic medication in Palonosetron group whereas some patients in Ondansetron group needed rescue antiemetic medication in the form of Metoclopramide.

Kim SH et al. compared the anti-emetic efficacy of Palonosetron with ondansetron or ramosetron in high-risk patients undergoing laparoscopic surgery. They reported that the overall incidence of nausea/retching/vomiting was lower in the Palonosetron (22.2%/11.1%/5.6%) than in the ondansetron (77.1%/48.6%/28.6%) and ramosetron (60.5%/28.9%/18.4%) groups. The rescue antiemetic therapy was required less frequently in the Palonosetron group than the other groups ( $P < 0.001$ ). Kaplan-Meier analysis showed that the order of prophylactic efficacy in delaying the interval to use of a rescue emetic was Palonosetron, ramosetron, and ondansetron. Our study confirmed the above.<sup>12</sup>

The study was conducted only in elective surgeries in patients with no obvious causes for nausea and vomiting. Patients with risk factors for post-operative nausea and vomiting like motion sickness, migraine and gastroesophageal reflux disease etc. were excluded from the present study. We decided to give the antiemetic medication towards the end of the surgery, 30 minutes before extubation.

## CONCLUSION

Nausea and vomiting during post-operative period (within 6 hours after recovery from anesthesia) were effectively controlled with administration of Ondansetron and Palonosetron 30 minutes before recovery. Postoperative nausea and vom-

iting in the 6-24 hours' postoperative period after recovering from anesthesia was significantly lower with Palonosetron when compared to Ondansetron. ( $p$  value  $< 0.01$ )

There were no statistically significant differences between the groups with respect to patient characteristics, type of surgery and duration of anesthesia. The postoperative sequelae, side effects and behavior of the patients, though not a part of our study were comparable in both the groups and both the drugs are safe for routine clinical use during laparoscopic procedures under general anesthesia.

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# A Controlled Comparison between Betamethasone Gel and Lidocaine Jelly Applied Over Tracheal Tube to Reduce Postoperative Sore Throat, Cough and Hoarseness of Voice

Uma Kuragayala<sup>1</sup>, Sriram Ravinutala<sup>2</sup>, Radha Ramana Murthy K<sup>3</sup>

## ABSTRACT

**Introduction:** Larynx is the common site of Injury during intubation. Local anesthetic agents, such as Lidocaine gel or spray, were ineffective in preventing sore throat after endotracheal intubation. Although these agents limit injury to tracheal mucosa and prevent cough, they cannot be effective in preventing sore throat because they do not have any anti-inflammatory effects.

**Materials and Methods:** A controlled comparison between Betamethasone gel and Lidocaine jelly applied over tracheal tube to reduce postoperative sore throat, cough and hoarseness of voice. A total number of 120 cases of ASA Gr-I and Gr-II were divided into three groups. 40 of them (Betamethasone group) were intubated with endotracheal tubes applied with Betamethasone gel (0.05%), 40 patients were intubated with ET tubes lubricated with 2% Lidocaine jelly (Lidocaine group) and the remaining 40 received lubrication with water soluble, non-irritating jelly (control group).

**Results:** Statistical analysis showed that Betamethasone gel provided a statistically significant benefit over Lidocaine jelly and the control for the reduction of sore throat at 1hr (P = 0.000016), 12 hrs. (P = 0.00) and 24 hrs. (P = 0.002). It has also been observed that Betamethasone offers a significant advantage over Lidocaine at 24 hrs. to reduce hoarseness of voice (P = 0.005).

**Conclusion:** Betamethasone, due to its anti-inflammatory effect, long duration of action, convenience of usage, cost effectiveness and a statistically proven effect and is a useful drug for reducing post-operative sore throat in the early and late post-operative periods and hoarseness of voice in the late post-operative period.

**Keywords:** Endotracheal intubation, Post-operative, Betamethasone, Lidocaine, Sore throat, Hoarseness of voice

to pulmonary aspiration.<sup>2,3</sup>

Post-operative sore throat, though a minor complication after general anesthesia can be distressing to the patients.<sup>4</sup> This is because of lack of airway humidity, trauma during airway-insertion and suctioning, high anesthetic air flow rates and surgical manipulation of airway and adjacent tissue.<sup>5</sup>

Different factors were known to correlate with occurrence of this complication, including sex, age, season, anesthetic drugs and gases, numbers of trials for intubation, duration of intubation, size of endotracheal tube its type and cuff type and size, site of the surgery, and application of Lidocaine or steroids.<sup>6</sup>

Many agents have been used as lubricants to reduce the incidence of postoperative sore throat with variable efficacy.<sup>7,8</sup>

The present study was undertaken to perform a controlled comparison between Betamethasone gel and Lidocaine jelly applied over tracheal tube to reduce postoperative sore throat, cough and hoarseness of voice.<sup>9,10</sup> Aim of study was to perform a controlled comparison between Betamethasone gel and Lidocaine jelly applied over tracheal tube to reduce postoperative sore throat, cough and hoarseness of voice

## MATERIALS AND METHODS

Institutional Ethics Committee approval and written, informed consent from all patients was obtained.

### Inclusion criteria

The patients fulfilling the following criteria were included in the study:

Age: Between 18 and 50 yr., 2. ASA physical status: class I or II, 3. Surgery (likely to last between 30 and 240 min) under general anaesthesia with orotracheal intubation.

Surgeries included procedures in supine position with expected extubation immediately after the operation.

## INTRODUCTION

Endotracheal intubation is necessary in general anesthesia to control respiration and protect airways. Almost all patients who are intubated for long term or short-term operations, have some degree of airway injury.<sup>1</sup>

Larynx is one of the most common sites of injury, usually manifested as local irritation, inflammation, and even necrosis. Although most of the injuries to the trachea are minor and reversible, some, however, may become severe. Due to edema and granuloma formation, injury to the trachea after extubation may manifest as acute or chronic obstruction of the airway that may be severe enough to necessitate surgical intervention. These injuries can also impair normal function of the larynx and its protective role and predispose the patient

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### Exclusion criteria

The patients with the following characteristics were excluded:

1. Patients undergoing surgeries of the oral cavity and pharynx.
2. Anticipated difficult airway, (Mallampati grade > 2)
3. Surgical duration of >240 min,
4. More than two attempts at intubation,
5. Use of throat packs, oesophageal temperature probes,
6. Patients with upper respiratory tract infection, asthma,
7. Known allergy to study drugs
8. Patients on steroid therapy.
9. Smokers, history of pre-operative sore throat.
10. Pre-anaesthetic evaluation was done in all patients.

One Hundred and twenty patients were randomized into the following three groups, of 40 patients each by the sealed envelope method:

1. **Betamethasone group:** Betamethasone gel 0.05% (Betagel, Micro Labs Limited, Bangalore, India) applied.
2. **Lidocaine group:** Lidocaine 2% jelly (Lox2% jelly, Neon Laboratories, Mumbai, India) applied.
3. **Control group:** Water soluble, non-irritating lubricating jelly (Lubic jelly, Neon Laboratories, Mumbai, India) applied.

### Anesthetic technique

**Pre-medication:** All patients were premeditated with tab Alprazolam 0.25 mg, the night before surgery and tab. Ranitidine 150 mg 2 h before surgery.

**Lubrication of tube:** At induction of anesthesia, Betamethasone gel, Lidocaine jelly, or water soluble non-irritating lubricating jelly was applied on the external surface of tracheal tube. The PVC tracheal tube was lubricated from the distal end of the cuff to a distance of 15 cm from the tip using 2.5 ml of Betamethasone gel, Lidocaine jelly or lubricating jelly, spread uniformly with sterile precautions. Single use PVC tracheal tubes, having low-pressure-high-volume cuffs, of size 8.0 mm, 8.5 mm and 7.0 mm, 7.5 mm internal diameter were used for male and female patients, respectively.

**Induction:** After connecting to standard monitors, adequate i.v. access, and preoxygenation, anaesthesia was induced with i.v. fentanyl 1.5µg /kg and thiopental sodium 5 mg/kg. I.V. vecuronium bromide 0.1 mg /kg facilitated tracheal intubation after 3 min following induction and assisted ventilation. Direct laryngoscopy was done with the use of a Macintosh laryngoscope blade by applying minimal pressure. All intubations were performed by an anaesthesiology resident with at least 2 yr of experience, who was blinded to group allocation. Immediately after intubation, the tracheal tube cuff was inflated with just enough room air to prevent an audible leak.

**Maintenance:** Anaesthesia was maintained with nitrous oxide 66%, sevoflurane 1–2% in oxygen, and i.v. bolus of vecuronium bromide was repeated intermittently to maintain adequate muscle relaxation. Intracuff pressure was not monitored. Humidifiers or heat and moisture exchangers were not used in any of the groups. The name of the jelly or gel used was not recorded on the anaesthesia chart, but was recorded separately in order to ensure that the anaesthetist in charge of the post-anaesthesia care unit remained blinded to the group

allocation of the patients.

**Reversal and Extubation:** At the end of the surgery, oxygen 100% was administered and residual neuromuscular block was antagonized with ivglycolpyrolate 0.01 mg/kg and neostigmine 0.05 mg/ kg. Oral suctioning by a 12 F suction catheter was done gently just before extubation only under direct vision to avoid trauma to the tissues and to confirm that the clearance of secretions was complete.

The trachea was extubated after deflating the cuff when patient fully awake. All patients received oxygen by a face-mask after operation. Assessment of patients for postoperative sore throat, cough, and hoarseness of voice at 1, 12, 24 h after surgery was carried out by the anaesthetist in charge of the post-anaesthesia care unit, blinded to the group allocation, using the questionnaire mentioned in the following:

#### Score:

##### Sore throat

0	No sore throat
1	Minimal sore throat, less severe than that noted with a cold
2	Moderate sore throat, similar to that noted with a cold
3	Severe sore throat, more severe than that noted with a cold

##### Hoarseness

0	No hoarseness at any time since the operation
1	No hoarseness at the time of interview, but present earlier
2	Hoarseness at the time of interview noted by patient only
3	Hoarseness that is easily noted at the time of interview

##### Cough

0	No cough
1	Minimal cough, less severe than that noted with a cold
2	Moderate cough, similar to that noted a with a cold
3	Severe cough, more severe than that noted with a cold

### STATISTICAL ANALYSIS

Data were analyzed by ANOVA (ANOVA Single factor, MS Excel) and post hoc Tukey's T-test wherever appropriate.

### RESULTS

Comparison between the age compositions of the three groups by ANOVA test has yielded a P value of 0.36 (which exceeds 0.05), hence the groups do not differ significantly in terms of age. Comparison between the weight compositions of the three groups by ANOVA test has yielded a P value of 0.53 (which exceeds 0.05), hence the groups do not differ significantly in terms of patient weight. Comparison between the mean duration of surgical procedures of the three groups by ANOVA test has yielded a P value of 0.82 (which exceeds

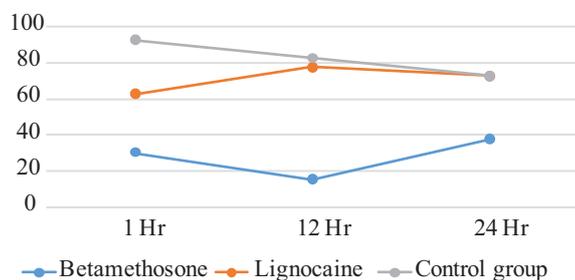
	Betamethasone		Lidocaine		Control		Remarks	
	Mean	S.D	Mean	S.D	Mean	S.D	P-value(from ANOVA test)	Result
Age	34.4	8.79	37	8.41	35.85	5.76	0.36	N.S
Weight	66.98	7.87	65.02	9.113	65.9	5.84	0.53	N.S
Duration of surgery	118.8	57.34	111.25	54.38	116.2	55.03	0.82	N.S

**Table-1:** Age, weight and duration of surgery

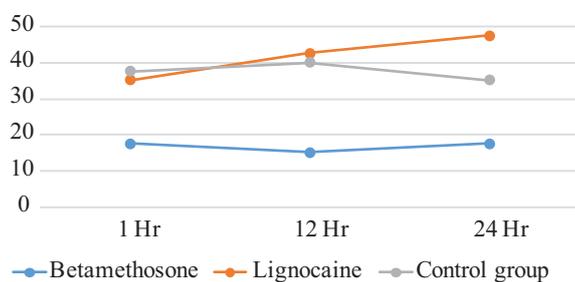
	Betamethasone		Lidocaine		Control Group		Remarks		
	Mean	S.D	Mean	S.D	Mean	S.D	P-Value	Result	TUKEY'S T- Test
<b>Sore Throat</b>									
1 hr.	0.625	1.07	1.275	1.16	1.78	0.851	.000016	S	B > L, B>C L ~ C
12 hrs.	0.25	0.661	1.15	0.76	1.25	0.731	0.00	S	B > L, B>C L ~C
24 hrs.	0.475	0.67	0.95	0.71	0.975	0.724	0.002	S	B > L, B>C L ~ C
<b>Cough</b>									
1 hr.	0.45	0.773	0.45	0.86	0.575	0.863	0.74	N.S.	N.A
12 hrs.	0.2	0.51	0.55	0.80	0.375	0.659	0.07	N.S.	N.A
24 hrs.	0.275	0.591	0.525	0.74	0.3	0.557	0.16	N.S	N.A
<b>Hoarseness</b>									
1 hr.	0.35	0.823	0.425	0.63	0.625	0.885	0.28	N.S.	N.A
12 hrs.	0.275	0.67	0.5	0.63	0.55	0.74	0.17	N.S.	N.A
24 hrs.	0.175	0.38	0.625	0.73	0.425	0.628	0.005	S	B > L, B~C L ~ C

B: Betamethasone; L: Lidocaine; C: Control; S.D: Standard deviation; >: Statically significant advantage; ~: no statistically significant advantage; N. S: Not Significant; S: Significant; N.A: Not Applicable

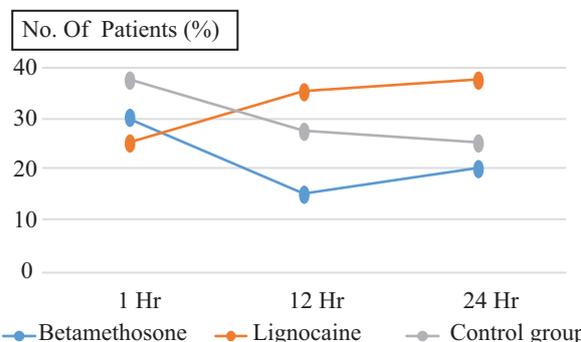
**Table-2:** Incidence of sore throat, hoarseness of voice and cough-intensity wise



**Graph-1:** Percentage incidence sore throat



**Graph-2:** Percentage incidence hoarseness



**Graph-3:** Percentage incidence cough

0.05), hence the groups do not differ significantly in terms of duration of surgery. Therefore, a statistical comparison is possible between these groups.

Comparative analysis of mean severity of sore throat at 1 hr. after surgery has yielded a P value of 0.000016 (which is less than 0.05). Thus it can be concluded that there exists a statistically significant difference in this aspect among the

three groups. Further testing is necessary to find out between which of the groups, the above said difference exists.

Analysis by Post-hoc Tukey's t-test was performed for this purpose. Therefore, there exists no statistically significant difference between Lidocaine and Control groups for the prevention of sore throat at 1 hr. after surgery.

Comparative analysis of mean severity of sore throat at 12 hr. after surgery has yielded a P value of 0.00 (which is less than 0.05). Thus it can be concluded that there exists a statistically significant difference in this aspect among the three groups. Further testing is necessary to find out between which of the groups, the above said difference exists. Analysis by Post-hoc Tukey's t-test was performed for this purpose. Therefore, there exists no statistically significant difference between Lidocaine and Control groups.

Comparative analysis of mean severity of sore throat at 24

hrs. after surgery has yielded a P value of 0.0024 (which is less than 0.05). Thus it can be concluded that there exists a statistically significant difference in this aspect among the three groups. Further testing is necessary to find out between which of the groups, the above said difference exists.

Analysis by Post-hoc Tukey's t-test was performed for this purpose. Therefore, there exists no statistically significant difference between Lidocaine and control groups.

Comparative analysis of mean severity of hoarseness of voice at 1 hr. after surgery has yielded a P value of 0.28 (which exceeds 0.05). Thus it can be concluded that neither Betamethasone nor Lidocaine provide a statistically significant prevention of hoarseness at 1 hr. after surgery, compared to the Control group.

Comparative analysis of mean severity of hoarseness of voice at 12 hrs. after surgery has yielded a P value of 0.17 (which exceeds 0.05). Thus it can be concluded that neither Betamethasone nor Lidocaine provide a statistically significant prevention of hoarseness at 12 hrs. after surgery, compared to the Control group.

Comparative analysis of mean severity of hoarseness of voice at 24 hrs. after surgery has yielded a P value of 0.005 (which is less than 0.05). Thus it can be concluded that there exists a statistically significant difference in this aspect among the three groups. Further testing is necessary to find out between which of the groups, the above said difference exists. Analysis by Post-hoc Tukey's t-test was performed for this purpose. Therefore, there exists no statistically significant difference between Betamethasone-Control and Lidocaine-Control groups.

Comparative analysis of mean severity of cough at 1 hr after surgery has yielded a P value of 0.74 (which exceeds 0.05). Thus it can be concluded that neither Betamethasone nor Lidocaine provide a statistically significant prevention of cough at 1 hr. after surgery, compared to the Control group.

Comparative analysis of mean severity of cough at 12 hrs. after surgery has yielded a P value of 0.07 (which exceeds 0.05). Thus it can be concluded that neither Betamethasone nor Lidocaine provide a statistically significant prevention of cough at 12 hr after surgery, compared to the Control group.

Comparative analysis of mean severity of cough at 24 hrs. after surgery has yielded a P value of 0.16 (which exceeds 0.05). Thus it can be concluded that neither Betamethasone nor Lidocaine provide a statistically significant prevention of cough at 24 hrs. after surgery, compared to the Control group.

## DISCUSSION

Post-intubation complications like sore throat, hoarseness of voice and cough are gaining increasing importance as we strive to minimize complications and improve patient satisfaction.<sup>11</sup>

Many factors such as intubation procedure, diameter of endo-tracheal tube, cuff type and pressure, movement of the patient while intubated (bucking), procedures such as pharyngeal suctioning have been implicated in the evolution of the three complications mentioned above. The mechanism postulated to explain these complications is local irritation

and subsequent inflammatory changes.<sup>12</sup>

Drugs like local anesthetic agents, local and systemic steroids, non-medicated lubricant jellies, Benzydamine and Ketamine gargles and interventions like cuff pressure monitoring (to limit intra-cuff pressure), minimizing pharyngeal suctioning etc., have been employed to reduce the incidence of the above problems,<sup>13-15</sup>

In our study, we have chosen to compare the effect of a steroidal anti-inflammatory agent Betamethasone and a local anesthetic agent, Lidocaine for reducing the incidence of sore throat, hoarseness of voice and cough.

Betamethasone is a long acting steroid with proven anti-inflammatory properties. The preparation we have used is a 0.05% gel (Betagel, Micro labs Limited, Bangalore, India). Its availability in an easy to apply gel form makes its usage convenient. The dosage of Betamethasone used in our study does not exceed 4 mg prednisone equivalent and can hence be regarded as safe. The above factors and existing literature in support of Betamethasone for this very purpose are the reasons for us to choose this drug for our study.

120 subjects had been allocated to 3 groups of 40 each (Betamethasone, Lidocaine and Control) by the sealed envelope method. Statistically arrived P value of less than 0.05 was to be considered as significant.

The groups did not differ significantly in terms of Age (P = 0.36), Weight (P = 0.53) or Duration of surgery (P = 0.82). The Endo-tracheal tube was lubricated prior to intubation and scores were recorded at 1 hr., 12 hrs., 24 hrs. after extubation by interviewing the patient. Each parameter was graded by severity from 0 (absent) to 3 (very severe).

### Sore throat

Statistical analysis of scores for sore throat at 1 hr. showed that Betamethasone was significantly better (P= 0.000016) than Lidocaine (as indicated by Tukey's test, the difference of means (0.65) is greater than HSD (0.56)) and Control group (as indicated by Tukey's test, difference of means (1.15) is greater than HSD (0.56)) while there was no significant difference between Lidocaine and Control groups (as indicated by Tukey's test, difference of means (0.5) is less than HSD (0.56)).

Analysis of scores for sore throat at 12 hr. showed that Betamethasone was significantly better (P=0.00) than Lidocaine (Tukey's test - difference of means (0.9) is greater than HSD (0.39)) and control group (Tukey's test - difference of means (1.0) is greater than HSD (0.39)) while there was no significant difference between Lidocaine and control groups (Tukey's test - difference of means (0.1) is less than HSD (0.39)).

At 24 hrs., analysis of scores for sore throat showed that Betamethasone was significantly better (P= 0.002) than Lidocaine (Tukey's test - difference of means (0.475) > HSD (0.38)) and control group (Tukey's test - difference of means (0.50) > HSD (0.38)) while there was no significant difference between Lidocaine and control groups (Tukey's test - difference of means (0.025) < HSD (0.38)). Thus, we infer from our study that Betamethasone gel is better than Lidocaine as well as the control for prevention of sore throat, both

in the early (1 hr.) as well as late (12 and 24 hrs.) post-operative period.

### Cough

Analysis of scores of cough at 1 hr. showed that there was no significant difference between the three groups ( $P = 0.74$ ). At 12 hrs. too, we could not observe a statistically significant difference ( $P = 0.07$ ). At 24 hrs. after surgery, the  $P$  value for analysis of severity of cough scores was 0.16, indicating that neither intervention provided a statistically significant benefit over the other.

### Hoarseness of voice

Analysis of scores for severity of hoarseness of voice at 1 hr. after surgery yielded a  $P$  value of 0.28, showing no significant difference among the interventions. At 12 hrs., again the difference among the 3 groups was not statistically significant. ( $P=0.17$ ). At 24 hrs. post-surgery, analysis indicated that Betamethasone was better ( $P = 0.005$ ) than Lidocaine (Tukey's test-difference of means (0.45) > HSD (0.32)) while there was no difference between Betamethasone and the control groups (difference of means (0.25) < HSD (0.32)) and Lidocaine and control groups (difference of means (0.25) < HSD (0.32)).

Therefore, we conclude that though at 1 hr. and 12 hrs. post-tubation, there was no significant difference between the groups, at 24 hrs. betamethasone has provided a statistically significant benefit over Lidocaine group in terms of preventing hoarseness. Lidocaine and control groups did not differ at any of the three study times.

Stride PC, (1990) concluded that 1% Hydrocortisone water soluble cream applied over the endo-tracheal tube, offered no reduction in incidence of sore throat. In their study, the cream was applied up to 5cm from the tip of the endo-tracheal tube.<sup>16</sup> In our study, the steroidal gel was applied more extensively so as to cover the parts of the tube coming in contact with the posterior pharyngeal wall as well and not only the tip of the tube which resides beneath the vocal cords. We attribute the benefit observed with Betamethasone in reducing the sore throat, to the widespread application of this gel. Selvaraj et al reported an increase in the incidence of cough and hoarseness in the Lidocaine group compared to the control group.<sup>17</sup> Our study results differ from theirs, and we found that the difference in incidence of cough and hoarseness between Lidocaine and control groups was statistically insignificant. This is probably because the extubation protocol in Selvaraj et al 's study was not standardized, which could have affected the incidence rates.

Sumathi et al reported that Betamethasone caused a significant reduction in incidence of sore throat, cough as well as hoarseness of voice.<sup>18</sup> Our study found that the beneficial effect of Betamethasone was primarily in the reduction of sore throat, while it caused a significant reduction of hoarseness at 24hrs, it was observed that Betamethasone made no statistically significant impact over the reduction of cough.

### CONCLUSION

It can be concluded from our study that, Betamethasone, due to its anti-inflammatory effect, long duration of action, convenience of usage, cost effectiveness and a statistically

proven effect is a useful drug for reducing post-operative sore throat in the early and late post-operative periods and hoarseness of voice in the late post-operative period.

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# The Relationship Between Lipid Profile and Hypertension

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## ABSTRACT

**Introduction:** Hyperlipidemia (HL) and High Hypertension (HT) are considered as risk factors for cardiovascular disease. Objective of the study was to study the relationship of lipid profile and hypertension.

**Material and Method:** The study was conducted among 240 subjects attending the outpatient of consultant physicians for routine health checkup in the city of Hyderabad, Telangana. 120 males and 120 females in the age group of 20-60 years without any major medical problem and those who were not on any medication were selected. They were assessed for their plasma lipid profile, anthropometrics (BMI) and blood pressure using standard methods and techniques.

**Results:** The results were found to be statistically significant for abnormal levels of lipids with changes in blood pressure.

**Conclusion:** The study correlated well with abnormal lipid profile levels and the incidence of higher blood pressure. Preventive measures and early diagnosis of hypertension and hyperlipidemia decrease the risk of cardiovascular disease. Hypertensive patients need measuring of blood pressure and lipid profile at regular intervals, as, elevated blood pressure may predict certain disturbances in lipoprotein metabolism.

**Keywords:** Hyperlipidemia (HL), Hypertension (HT), Coronary Artery Disease (CAD), Cardiovascular Disease (CVD), Triglycerides (TG), Total Cholesterol (TC), High Density Lipoprotein (HDL)

## INTRODUCTION

Hypertension (HT) is the most common chronic medical problem prompting frequent visits to the health care providers once it is diagnosed. It is not very often accompanied by any symptoms initially and its identification is usually through screening or when seeking health care for an unrelated problem. Hypertension is diagnosed on the basis of persistently high blood pressure.

World Hypertension League (WHL), an umbrella organization recognized that more than 50% of the Hypertensive population worldwide is unaware of their condition. To address this problem, WHL initiated global awareness campaign through mass media and public rallies and dedicated May 17<sup>th</sup> as World Hypertension Day.<sup>1</sup>

Hypertension is ranked as the third most important risk factor for attributable burden of disease in South Asia (2010).<sup>1</sup> World Health Organisation (WHO) has identified hypertension as the leading cause of cardiovascular mortality. Sustained hypertension over a period of time is a major risk factor of hypertensive heart disease, coronary artery disease, stroke, aortic aneurysm, peripheral artery disease and chronic kidney disease.<sup>2</sup> Hypertension is directly responsible for 57% of all stroke deaths and 24% of all Coronary Artery dis-

ease (CAD) deaths in India<sup>3</sup> and it is recognized globally as a major risk factor for Diabetes and renal disease. Published literature reports regional variations in mortality and prevalence of CAD and stroke in India. According to statistics South India has increased CAD mortality and Eastern India has high stroke rate.<sup>4</sup> Similar variations are also seen among urban and rural areas with CAD prevalence being higher in urban parts of India.<sup>4,5</sup> According WHO 2008 estimates the prevalence of hypertension in India was 32.5% (32.2% in males and 31.7% in females). Recent studies from India have shown the prevalence of hypertension to be 25% in urban and 10% in rural people in India.<sup>6</sup> Blood pressure rises with aging and risk of becoming hypertensive in later life is considerable.

As such hypertension exerts a substantial public health burden on cardio vascular health status and health care system in India. About 80% of hypertensives have co-morbidities such as obesity, glucose intolerance, and abnormalities in lipid metabolism (hyperlipidemia).

Hyperlipidemia involves abnormally elevated levels of any or all lipids in the blood like TG-triglycerides and TC-total cholesterol. Hypertension and Hyperlipidemia are silent markers and dangerous risk factors for cardiovascular disease (CVD) and account for more than 80% of deaths and morbidity in developing countries.<sup>7</sup> The objective was to study the association between blood lipid levels and hypertension.

## MATERIAL AND METHODS

The study was conducted among 240 subjects attending the outpatient department of consultant physicians for a routine health checkup in the city of Hyderabad, Telangana. 120 were males and 120 females. The subjects selected were in the age group of 20-60 years without any major medical problem and those who were not on antihypertension medication or lipid lowering drugs.

### Measurements

After obtaining oral and written consent, height and weight were measured with the subject in light cloths without shoes

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and BMI (kg/m<sup>2</sup>) was calculated.

Blood Pressure (BP) was measured by the physician using standard BP measurement protocol after the subject has rested for 10 mins. Two measurements were taken by mercury sphygmomanometer with 5 mins interval. The mean for systolic blood pressure (SBP) and diastolic blood pressure (DBP) was recorded. Hypertension was defined as SBP $\geq$ 140 mm Hg and DBP  $\geq$  90 mm Hg without antihypertension medication according to the 7<sup>th</sup> report of Joint National Committee on Prevention, Detection, Evaluation and Treatment of high blood pressure (JNC-7).

### Biochemical Analysis

A volume of 5ml of venous blood was collected in the morning after a 12 hr over night fast and serum was separated and centrifuged and analysed for serum lipid profile. Lipid profile parameters like total cholesterol (TC), triglycerides (TG) and high density lipoprotein (HDL) were estimated by enzymatic colorimetric method.

According to the National Cholesterol Education Programme expert panel on Detection, Evaluation and Treatment of high cholesterol in adults, the values are as follows:

TC (mg/dl) = < 200 - Desirable  
200-239 - Borderline high  
> 240 - Very high

TG (mg/dl) = < 150 - Desirable  
150-199 - Borderline high  
>200 - High

HDL (mg/dl) = <40 - Low  
 $\geq$  40 - Desirable

### RESULTS

By statistical package for social science (SPSS) software the results were presented as Mean, Standard Deviation (SD) and were compared using Student's t-test and a P-value  $\leq$  0.05 was considered statistically significant.

The chi-square statistic is 63.8023. The p-value is <0.00001. The result is significant at  $p < .05$  (Table-1). As age advances the risk of HT was found to be higher. Maximum number of cases of HT were in the age group of 40-60years.

The chi-square statistic is 43.4699. The p-value is < 0.00001. The result is significant at  $p < .05$  (Table-2). As the levels of serum TG increased, the incidence of HT also increased, with maximum number of HT cases being at TG >200.

The chi-square statistic is 22.5272. The p-value is .000013. The result is significant at  $p < .05$  (Table-3). High levels TC showed increased incidence of HT. more number of HT cases being at TC >240.

The chi-square statistic is 14.6581. The p-value is .000129. This result is significant at  $p < .05$  (Table -4a).

The chi-square statistic is 26.8646. This result is significant at  $p < .05$ .

In Table 4a and 4b with HDL levels >40, 34.6% (males) and 24.3% (females) had incidence of HT compared to HDL <40. The number of females with high levels of HDL was 103 as compared to 81males, giving an advantage to females against CAD.

The study included 240 subjects, 120 male and 120 female. Maximum number of HT cases was found in the Age group of 40-60 years, BMI >30, Male to female ratio 1.25:1. The number of HT cases was more with advanced age and high BMI. Males were found to have the incidence of HT more compared to females.

In Table 2 and 3 as the level of TG and TC increased the incidence of HT was found to be more. The mean  $\pm$ SD of TG 167.24  $\pm$  70.11, TC 194.11  $\pm$  37.05. In Table 4a and 4b, the serum HDL was significantly lower in HT cases, mean  $\pm$  SD being 40.75  $\pm$  6.95 in males and 44  $\pm$  5.75 in females. The mean SBP was 144.8 and DBP was 98.2. the results were found to be statistically significant at P value <0.05.

### DISCUSSION

It is widely accepted that Cardio Vascular Disease (CVD) is

Age (Yrs)	Blood pressure		Total		
	Normal	%		Hypertension	%
20-30	50	84.7	9	15.3	59
31-40	28	45.2	34	54.8	62
41-50	15	23.4	49	76.6	64
51-60	11	20	44	80	55
				Total	240

Table -1: Variable of blood pressure in relation to age

TG	Blood pressure		Total		
	Normal	%		Hypertension	%
<150	108	60	72	40	180
150-199	5	20.8	19	79.2	24
$\geq$ 200	2	5.6	34	94.4	36
				Total	240

Table-2-Variable of BP in relation to Triglycerides

TC	Blood pressure		Total		
	Normal	%		Hypertension	%
<200	104	56.2	81	43.8	185
200-239	9	22.0	32	78.0	41
$\geq$ 240	2	14.3	12	85.7	14
				Total	240

Table-3: Variable blood pressure in relation to total cholesterol

HDL	Blood pressure		Total		
	Normal	%		Hypertension	%
<40	11	28.2	28	71.8	39
>40	53	65.4	28	34.6	81
				Total	120

Table-4a: Variable Blood Pressure in relation to HDL (Male)

HDL	Blood pressure		Total		
	Normal	%		Hypertension	%
<40	2	11.8	15	88.2	17
>40	78	75.7	25	24.3	103
				Total	120

Table-4b: Variable Blood Pressure in relation to HDL (Female)

associated with hypertension and increased levels of TC and TG. Individually decreased HDL is also risk factor for CVD. Epidemiological studies have established a strong association between hypertension and Coronary Artery Disease (CAD). Hypertension results are from a complex interaction of genes<sup>8,9</sup> and environmental factors. Several environmental factors influencing blood pressure – diet, increased salt intake, lack of exercise, obesity, stress, depression, Vitamin D deficiency<sup>10</sup> play a role in individual cases. As such HT can be considered as a preventable risk factor for premature deaths worldwide.

Hyperlipidemia also has a genetic and environmental etiology<sup>11</sup>, dietary factors playing a major role. According to Framingham study, vast amount evidence has confirmed the critical role played by hyperlipidemia in the pathogenesis of atherosclerosis. Hyperlipidemia results in increased risk of premature atherosclerosis with, structural narrowing of small arteries and arterioles, leading to endothelial dysfunction, and vascular inflammation contributing to increased peripheral resistance and hypertension.<sup>12,13</sup> Autopsy studies conducted in human coronary arteries and aorta from various parts of the world conclude that atherosclerosis is more extensive in hypertensive patients<sup>14</sup> and that atheromas appear in high pressure segments of circulation.<sup>15</sup> So in the workup of hypertensive patients, investigation of lipid profile plays an important role in CAD.<sup>16</sup>

This study was done to show the relationship between serum lipid profile and hypertension among urban population in the age group of 20-60 years. The prevalence of hypertension was found to be high in the age group of 40-60 years and high in males compared to females. Hypertension was found to be high with BMI  $\geq 30$ . This shows that subjects with high BMI and advanced in age predispose to HT and CVD.

The number of hypertension cases was found to be more with TG levels  $\geq 150$  mg/dl, 88.3% as compared to 45.6% with  $<150$  mg/dl. High percentage of hypertension cases was seen with TC  $\geq 200$  mg/dl, 74.5% as against 49.2% in  $\leq 200$  mg/dl, indicating that high levels of TG and TC are risk factors for development of hypertension. The male subjects with  $\geq 40$  mg/dl HDL had only 34.6% prevalence of HT as against 71.8% with  $\leq 40$  mg/dl HDL, and 88.3% of hypertension with  $\leq 40$  mg/dl and 24.2% with  $\geq 40$  mg/dl in females. Out of 120 females 103 had HDL  $\geq 40$  mg/dl as against 81 males. So female subjects were found to have higher levels of HDL compared to males and accordingly the number of HT cases in females is less than males giving protection to females against CAD.

Low physical activity and consumption of diet with more of carbohydrates and saturated fatty acids such as fast-food have been associated with hyperlipidemia.<sup>17</sup> According to Dancy<sup>18</sup> habitually active men and women are less likely to have hyper triglycerides and less HDL concentration.

The positive correlation between lipid profile and BMI, and HT were in collaboration with previous studies and reaffirmed the role of lipids in the pathophysiology of overweight and obesity as well as increased accumulation of lipids with age.<sup>18-20</sup>

## CONCLUSION

This study showed that advanced age and increased BMI were more likely to develop HT and HT is seen to be more prevalent in males compare to females. The subjects with HT were more likely to have hyperlipidemia including high TC and high TG with reduced HDL cholesterol levels.

Preventive measures and early diagnosis of HT and Hyperlipidemia decreases the risk of CVD in general population. Hypertensive patients need measuring of BP and lipid profile at regular intervals to prevent CVD and stroke, as elevated BP may predict certain disturbance in lipoprotein metabolism.

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# A Study on Estimation of Blood Loss During Third Stage of Labour in Relation to Total Blood Volume in A Tertiary Care Hospital, Niloufer, Hyderabad

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## ABSTRACT

**Introduction:** Statistics of pregnancy mortality surveillance system of CDC 11.3% of maternal deaths are taking place every year due to loss of blood during process of delivery. Effective management of pregnancy from conception to post partum period can reduce maternal deaths. Objective of the study was to evaluate the amount of blood loss in third stage of labour in relation to total blood volume.

**Materials and methods:** 200 cases of normal pregnant women who came to Niloufer Hospital were included in the study. Percentage of blood volume lost was calculated by using formula.

**Results:** Wide variations in percentage of blood loss were observed from 0.5% to 10% of total blood volume.

**Conclusions:** In the same amount of blood loss during delivery, the Patients with lesser blood volume developed features of PPH than the patients with high blood volume. Improvement of socio-economic status is essential.

**Keywords:** APH, PPH, CDC, PCV, TB

amount of blood loss during third stage of delivery in relation to total blood volume.

## MATERIALS AND METHODS

200 Cases of normal pregnant women who came to Niloufer Hospital for delivery were booked for estimation of blood loss during delivery. Normal cases include all the patients except patients with anemia, pregnancy induced hypertension and APH.

200 normal pregnant women were booked for estimation of blood loss. At the time of clinical examination, weight of the patient and Hb% through Sahli's method were taken. PCV was estimated through microcapillary method.

After delivery of the patient, blood loss was collected in a basin and then measured in a 100 ml of graduated jar. Data of 200 patients were compiled in excel sheet and by using the following parameters data was analyzed. Blood loss with reference to total blood volume, age, Body weight of mother, Baby weight and parity were estimated. Estimation of blood loss by collection and optical density method<sup>3</sup> was done and both compared. The percentage total blood volume lost was calculated by using the formula:

$0.036x \text{ Observed hematocrit} \times \text{estimated blood loss} / \text{Body weight}$

Data of 200 patients compiled in excel sheet by using the following parameters and data was analyzed. Blood loss with reference to total blood volume, age, body weight of the mother, baby weight and parity were analyzed.

Blood volume ranging from 3500-5000 ml showed decrease in blood loss and decrease in percentage of total blood volume lost., 7.2% to 3.63%. Blood loss through alkaline hematin method showed almost double the amount of blood loss when compared to measured.

Body weight ranging from 40 to 60 kg showed a direct increase in total blood volume from 3627.77 ml to 5212.64 ml. Baby weight ranging from 2-4 kg also showed an increase in total blood volume 3936.44 to 4692.17.

## INTRODUCTION

Third stage of labour is always a time of anxiety which no obstetrician ever wholly outlives. No where else in obstetrics is expert judgement, cool and organized thinking and action at a greater premium.

The amount of blood loss immediately and after delivery remains a clinical problem for three reasons:

1. Severe bleeding may occur suddenly and unexpectedly and transfer normal delivery in to a catastrophe.
2. Postpartum hemorrhage forms a leading cause of maternal death.
3. There is always need for finding new techniques, safe and effective ways of preventing and treating obstetric hemorrhage.

PPH is defined in obstetric text books as a loss of volume of blood be it 500ml/1000ml. This concept can be misleading because certain blood loss in a patient with large blood volume might be insignificant, whereas the same blood loss in a patient with small blood volume might be highly significant. It would seem to be more pertinent to evaluate and record blood loss at delivery as a percentage of estimated blood volume.

It is recommended that PPH be defined as a loss of blood at delivery of greater than 15% of total blood volume.<sup>1,2</sup> The present study is conducted in a tertiary care hospital to evaluate the amount of blood loss during third stage of labour in terms of percentage of total blood volume. To evaluate the

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Blood loss and percentage of total blood volume lost are more in abnormal cases when compared to normal deliveries.

Estimated blood volume was compared to direct estimation of blood volume by Statzer<sup>5</sup> as shown in the table. It was found to be closely related with above studies except patient who were anemic. There is an inverse relationship of hematocrit (PCV) to blood volume.

**DISCUSSIONS**

In obstetric text books, PPH has been defined as loss of blood 500ml or more. According to George Nelson<sup>2</sup>, this concept can be misleading. Since certain blood volume might be highly insignificant whereas the same blood loss in a patient with small blood volume may be highly significant. So it is better to evaluate and record blood loss at delivery as percentage of estimated blood volume and PPH has been defined as a loss of 15% of total blood volume.

Abraham Shulman criteria<sup>1</sup> of PPH:

1. 10% of TBVL –No apparent clinical signs
2. 20% of TBVL-definite clinical signs
3. 30% of TBVL-collapse

William E. Lucas<sup>4</sup> classification of PPH:

Class I-Loss of 15% of Total blood volume (TBV)

Class II-20-25% of TBV

Class III-30-35% of TBVL

Class IV-40-45% of TBVL

In the present study, blood loss was showed wide variations 0.5 to 10%. More than 10% was considered as obstetric hemorrhage. When blood loss was approximately same, .e., 190 ml in two groups of patients, blood volume of 3000-3500 and 5000-5500 ml the percentage of total blood volume lost was 5.7% and 3.363%. With increasing blood volume, the percentage of total blood volume lost is decreased. This is to show that patient with lesser blood volume develops features of hemorrhage with less amount of blood loss than a patient with higher blood volume with the same amount of blood

loss.<sup>5-7</sup>

In the present study like Abraham Shulman, 10% of TBV norm has been taken to classify as PPH as the the patients recruited for the study belong to low socio-economic group with low blood volume. In the present study, up to 10% of TBVL no apparent clinical signs, 10-20% of TBVL with slight clinical changes like increased pulse rate and slight falling in BP. More than 25% showed marked changes in PR, BP and pallor.<sup>8</sup>

As total blood volume of a patient with normal pregnancy has to be calculated to know the percentage of total blood volume lost the relation of the total blood volume to various factors has been noted. Estimated blood volume was compared to direct estimation of blood volume by Statzer as shown in table-4. According to Lund Donovan<sup>7</sup> hematocrit varies inversely with plasma volume with no changes in blood cell volume. In this study also hematocrit was noted to be inversely related to blood volume as shown in table -4. F.F Hytten and DB Paintor<sup>6</sup> explained that increase in blood volume forms part of adoptive mechanism and shows increase in plasma is related to size of the baby. Thus increase of birth weight of the baby is related to increase of plasma volume. In this study also showed similar results as shown in table-2. According to Lund and Donovan increase in plasma volume is proportional to gain in mother’s weight after 24 weeks of gestation. Similar results were observed in the present study as shown in table-2.<sup>9,10</sup>

Since there is considerable variation between patients in amount of blood loss and it seemed worth to enquire for the possible cause. There was undoubtedly many factors that affect blood loss in even apparently normal women. No obvious effects due to age, race and antenatal care etc., were noted by Newton. Same thing was noted in the present study. According to Michel Newton operative delivery by use of forceps did not shown increase of blood loss. It might be due to episiotomy that is always required. Similar observations were made in the present study also. Previous studies

S. No	Mother’s blood volume (ml)	No of cases	Blood loss-measured	Blood loss-alkaline method	% Of total blood volume lost-measured	% Of total blood volume lost-alkaline method
1	3000-3500	18	91.44	194.01	2.7	5.75
2	3501-4000	66	120.43	272.67	2.6	7.2
3	4001-4500	57	111.40	263.46	2.39	6.51
4	4501-5000	36	103.9	240.53	2.4	5.1
5	5001-5500	16	83.75	190.12	1.72	3.63

Chi square value=1.6653; P=0.999772; Not significant at 0.05

**Table-1:** Relation of blood volume to blood loss and percentage of total blood volume lost

S. No	Mother’s body weight in kgs	No of cases	Blood volume-TBV (ml)	S.No	Baby weight in kgs	No of cases	Blood volume-TBV (ml)
1	40-45	31	3627.77	1	2-2.5	64	3936.44
2	46-50	80	3932.76	2	2.6-3	108	4323.17
3	51-55	46	4401.40	3	3.1-3.5	20	4468.81
4	56-60	28	4821.92	4	3.6-4	8	4692.17
5	60+	16	5212.64				

**Table-2:** relation of blood volume to mother’s body weight and baby’s birth weight

S. No	Type of delivery	Blood volume- TBV (ml)	Blood loss ah meth- od ml	% Of TBV-ah method
1	Normal	4400	190	4.31
2	Abnormal			
	Instrumental	3943.73	346.99	8.9
	Post caesarian	4227.66	438.6	10.37
	Accelerated labour	42.98.36	379.6	8.83
	Malpresentation	3955.13	289.75	7.32

**Table-3:** Relation of blood loss and percentage of total blood volume lost in normal and abnormal cases

S. No	PCV	Direct blood volume statzer ml/kg	Estimated by formula george nelson ml/kg	Present study -pcv	Present study – estimated by formula ml/kg
1	36.6	68	76	37	75.4
2	39.4	77	71	39	71.5
3	31.2	97	91	31	90.02
4	32.0	99	87	32	87.2
5	37.6	77	74	37	75.2
6	34.7	76	81	34	82.07
7	32.9	81	85	33	84.5
8	29.1	73	96	29	96
9	NIL	NIL	NIL	27	103.3

**Table-4:** Comparison of direct blood volume and estimated by formula

noted height and weight of mother may show relation to blood loss but Michel Newton study, there was no information on relationship to age, physical type, nutritional status of mother, prolonged labour etc., in contrast to the present study showed an increase in loss of blood with increase in mother's weight post caesarian cases delivered vaginally those delivered after accelerating the labour etc., excessive blood loss as shown in the table-3.

## CONCLUSIONS

200 cases were booked for the study. Blood loss during delivery was measured both qualitatively and by using Alkalinehematin method. Total blood volume and percentage of blood loss were calculated by using the formula.

Wide variations in blood loss ranging from 0.5 to 10% in normal cases were observed. Efforts to improve socio-economic status of the patients and early intervention can reduce blood loss to tolerable obstetric hemorrhage levels. Greater than 10% of blood loss patients can be recognized early and timely intervention of stopping of blood loss and replacement will benefit the mother. Patients with high blood volume can withstand better with certain amount of blood loss than a patient with low blood volume. Loss of blood is more in abnormal vaginal deliveries and increase of weight of mother and infant. Patients with high blood volume tolerate PPH better than patients with low blood volume.

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# Clinical Study and Management of Peritonitis

Sharanbasappa<sup>1</sup>

## ABSTRACT

**Introduction:** Spontaneous bacterial peritonitis (SBP) is a common bacterial infection in patients with cirrhosis and ascites requiring prompt recognition and treatment. The aim of this study was to determine the prevalence, and characteristics of SBP among in-patients with cirrhosis and ascites seen at our facility. Peritonitis accounts for 25-30% of abdominal emergencies. The study conducted to evaluate prevalence, aetiology, treatment, complications and prevention of peritonitis in a tertiary care set up.

**Materials and Methods:** It is a descriptive study of 170 subjects admitted with peritonitis in KIMS Hospital, Hubli. Localised peritonitis cases were excluded from study. A pre-tested format was designed for collection of data. Variables like clinical findings, laboratory investigations, mode of treatment administered and complications developed during and post operatively were included for data collection and analyzed as per demographic factors wise.

**Results:** In the study 170 cases of peritonitis were included. Prevalence of generalized peritonitis in hospitalized cases was 0.39% and it was 1.98% in surgical admissions. The generalized peritonitis cases were among abdominal emergencies was 37.78%. 59% of cases were in the age group of 20-50 years. The commonest symptom observed in the study was pain abdomen. Patients admitted with generalized peritonitis had previous history of fever (27.06%) and pain abdomen (22.35%). The cases were examined radiologically and showed 105 positive out of 146 radiologically examined cases. On bacteriological examination, exudates was purulent in 40.12% of cases.

**Conclusion:** Peptic ulcer was the commonest cause for peritonitis (44.91%). It was observed more in males (4 times to females). Diagnosis was done mainly through clinical examination and confirmed through laboratory investigations. Simple closure of perforation was done in half of the cases. 35 cases died due to sever toxemia and hypotension.

**Keywords:** Peritonitis, Ascites, Exudate

## INTRODUCTION

Diffuse peritonitis continues to be a clinical challenge with respect to diagnosis, therapy, morbidity and mortality. It starts as if nothing from nowhere and ends up in the victims death. It was especially true till the beginning of this century where the mortality rate exceeded 90%. The advent of antibiotics, surgical skills and diagnostic facilities have phenomenally reduced the morbidity and mortality due to delayed presentation, low socio-economic and co-morbid conditions (Vasantkumar, 1998).<sup>1,2</sup>

Peritonitis accounts for 25-30% of acute abdominal emergencies. It is commonly found in adults (20-40 yrs). It is a major catastrophe where a successful outcome is more dependent upon early diagnosis and prompt institution of treatment. It is the most easily diagnosed acute abdominal con-

dition, provided the symptoms are known and appreciated. Peritonitis, while no longer the over whelming problem it once was, is still the most common cause of death following surgical treatment of abdominal emergencies. With modern facilities like early presentation, early diagnosis, advances in metabolic care, improved anaesthesia and introduction of antibiotics, morbidity and mortality rates have considerably come down.<sup>3,4</sup>

So this present study "Clinical Study and Management of Peritonitis" is conducted to evaluate various etiologies, prevalence of age and sex distribution, prevention, treatment and complications of peritonitis. Through it may not be possible to completely prevent the morbidity and mortality but we may be able to improve the results. That is the aim of conducting this study. The objective of the study was to know the prevalence of generalized peritonitis, etiology, distribution, types of operative procedures adopted, complications, morbidity and mortality among the patients admitted in KIMS Hospital, Hubli.

## MATERIALS AND METHODS

Materials and methods comprised of detailed descriptive study of 170 cases of diffuse peritonitis, admitted to KIMS Hospital, Hubli during the period of July 1997 to June 1999. All cases of localised peritonitis were excluded from the study. In collaboration with department of pathology, histopathology evidences were studied in suspected cases of typhoid, tuberculosis and malignancy. Bacteriological and their sensitivities were studied in collaboration with department of microbiology.

After admitting, the cases were followed up according to the proforma. After taking a detailed history and recording the examination findings, the cases were selected on the basis of clinical diagnosis of peritonitis and the diagnosis was confirmed by the investigation or laparotomy.

Apart from routine urine and blood investigation x-ray abdomen in erect posture and lying down position ( to detect free gas under diaphragm, pneumoperitonium and for studying the gas pattern of intestine ) was undertaken in majority of cases. The paracentesis was done and aspirate was sent for analysis.

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After correcting dehydration, electrolyte imbalance and under proper antibiotic cover, laparotomy was performed under general anaesthesia. Cases which were not fit for the same were treated conservatively. The incision depended on the site of pathology. The viscera were inspected carefully, the site of lesion located and the appropriate surgical procedure performed. Peritoneal toilet and wash with normal saline were carried out and the peritoneal cavity was drained.

The abdomen was closed in layers. Postoperatively, the patients were put on nasogastric suction, antibiotics and i. v. fluids. Oral fluids were started after the appearance of bowel activity. The complication ( general and local ) were dealt with appropriately and late followup was difficult after discharge as majority of them did not return for a check – up.

## RESULTS

During study period from 1997-99 at KIMS Hospital, Hubli 170 cases were admitted with generalized peritonitis. The age group is ranging from 15 days of birth to 80 years. Majority of peptic ulcers were done in the age group of 20-48 years and the mean age is 36.6 years.

Table 3 shows radiological diagnosis was positive in 105 patients of 146 radiologically examined cases (71.91%) in 24 patients x ray could not be taken, a few were moribund and others due to technical problems. Abdominal haze was found in cases of primary peritonitis. Multiple air and fluid levels were found in cases of large bowel malignancy and ileal TB with pneumoperitoneum. Gas under diaphragm was present in 92.85% of peptic ulcer perforations and in 70% of ileal perforations (non specific and typhoid). In the rest of the cases it was helpful in only 23% of cases.

Peritoneal exudates and bacteriological examination, 40.12% with purulent exudates, 30% bilious exudates, sero-purulent in 12% of cases, hemorrhagic in 11% and 7% of the cases it was faeculent in nature.

Peritoneal fluid was sent for culture and sensitivity and found E.Coli as commonest organism 43 cases (25.29%), Mixed organisms in 32% of cases. No organism was found in 54 cases.

Bacterial sensitivity of 114 cases was observed. Most of the organisms were sensitive to gentamicin, ampicillin and tetracycline. Mixed organisms responded to gentamicin, chloramphenicol, ciprofloxacin, cefotaxime and ampicillin. Metronidazole was used in 170 cases, ciprofloxacin in 149 cases and only in 2 cases crystalline penicillin was used.

Laparotomy was done in 3 three cases because they were not fit for moribund cases. In 50 cases simple closure with peritoneal lavage was done and in 49 cases simple closure with Graham's omental patch with peritoneal lavage was done. Exploratory laparotomy with lavage was done in 15 cases. Resection and anastomosis with lavage was done in 24 cases. Table 4 shows distribution of both general and local complications. The commonest complication found under general complication was toxemia and shock. Next common complication was pulmonary. In local complication, stitch abscess and wound infection. Mean duration of hospital stay is ranging from 11-20 days.

Signs and symptoms	No of cases	%
Pain abdomen	169	99.41
Vomiting	112	65.88
Distension	97	57.06
Fever	98	57.65
Constipation	73	42.94
Diarrhoea	14	8.24
Others	9	5.29
Poor GC	69	40.59
Distension	97	57.06
Tend/rigid/Guarding	170	100
Paralytic ileus	138	81.18
Oblit. Liver dullness	113	66.47
P/R tenderness/Bulge	25	14.71

**Table-1:** Prevalence of signs and symptoms in generalized peritonitis cases

Previous history	No of cases	%
Pain abdomen	38	22.35
Fever	46	27.06
Others	6	3.54
No History	80	47.06

**Table-2:** Previous history

Cases	Gas under diaphragm present	Gas under diaphragm absent	%	X ray not taken
PUP	65	5	92.85	5
NSSBP	17	7	70.83	3
Typhoid P	7	3	70	-
Traumatic P	4	4	50	4
Appendicular P	6	4	60	1
Tubercular P	2	0	100	-
Malignant P	0	2	-	2
Post op P	1	2	33.33	2
Primary P	1	8	11.11	-
Patient with poor general conditions	0	0	-	3
Others	2	6	25	4
total	105	41	71.91	24

**Table-3:** Radiological examination results

Table 5 shows 35 deaths among 170 cases of diffuse peritonitis with mortality rate of 20.58%. Death rate was observed to be maximum in typhoid perforations (40%) and post operative peritonitis cases (40%). It was less in peptic ulcer perforations (12%), appendicular perforations (9.09%) and tubercular perforative peritonitis.

Death rate is observed to be related directly to the duration of onset and presentation. Out of 35 cases who presented with 24 hours, the mortality rate was 2.86%. It was 10.64% among those who presented within 25-48 hours and increased to 25% for those who presented in between 49-72 hours. 32% mortality rate was seen in cases, who presented in between 73-96 hours and increased to 66.67% for those who

General complications	No. of cases	%	Local complications	No. of cases	%
Pulmonary	17	10.18	Wound infection	22	13.17
Cardiac	5	2.99	Stich abscess	27	16.17
Renal	1	0.6	Burst abdomen	16	9.58
Toxemia and shock	24	14.37	Faecal fistula	10	5.99
Thrombotic	5	2.99	Paralytic ileus	9	5.39
Hypoproteinaemia	5	2.99	Intestinal obstruction	7	4.19
			Pelvic abscess	5	2.99

Table-4: Post operative complications

Duration in hours	Total cases	No. of deaths	Mortality rate
0-24	35	1	2.86
25-48	47	5	10.64
49-72	36	9	25
73-96	25	8	32
>96	24	10	41.68
Cases treated conservatively	3	2	66.67
Total	170	35	20.58
Chi <sup>2</sup> =9.038; DF=2; p=0.05 significant			

Table-5: Pattern of mortality

presented after 96 hours. Mortality rate was observed to be more among old age patients than younger group.

Discussion:

**Age and sex prevalence:** Largest number of cases were in the 3<sup>rd</sup> and 4<sup>th</sup> decades with male to female ration of 4.14:1. This is similar to that reported by Bhansali et al in 1967<sup>2</sup> (M:F 4.7:1) and by Budharaja et al in 1973<sup>4</sup> (M:F 4:1). In their series of 161 cases Desa L.A et al 1983<sup>7</sup> reported age range of 15-83 years with an average of 31.5 years. Kachroo R. et al<sup>9</sup> reported age range of 3 days to 65 years with equal sex ratio. The peak incidence in the present study was 20-40 years with male to female ratio was 4.15:1. Desa L.A. et al 1983<sup>7</sup> reported sex ratio 4.75:1. Tripathi M.D. et al 1993<sup>18</sup> reported M:F 2.63:1 with age range of 3 months to 81 years and peak incidence was in the 3<sup>rd</sup> decade (38.8%) followed by 2<sup>nd</sup> decade (28.8%). In traumatic perforations in the present study were belong to 18-33 years with sex ratio of M: 5:1 as against 5.2:1 by Jolly S. et al 1993<sup>8</sup>, 6:1 by Macbath 1996 and 4.4:1 by Dent et al 1998.

**Signs and symptoms:** Pain, vomiting, distension of abdomen and raised temperature were the predominant symptoms in the present study. Similar findings were observed with the studies of Desa L.A. et al<sup>7</sup>, Kachroo R. et al<sup>9</sup>, Kohli V. et al<sup>10</sup>, Dandapat M.C et al<sup>6</sup> Tripathi M.D et al<sup>18</sup>, Boxied D. et al<sup>3</sup>, Garache F. et al and Aller R. et al.<sup>1</sup> Tenderness, rigidity and vomiting were found in 100% of cases. These findings were similar with above studies.

**Investigations and peritoneal fluid culture:** Low Hb% and leucocytosis were found in the present study. Total count increased in septic abortions and appendicular perforations. Minimal increase was observed in peptic ulcer perforations. Similar results were seen in Crile et al<sup>5</sup>, Rao D.C.M. et al<sup>16</sup>, Kachroo R et al<sup>9</sup> and Tripathi M.D. et al.<sup>18</sup>

Peritoneal exudates/blood culture was positive in 68.24% of patients in the present study with E. Coli as a common or-

ganism in 25.29%. Mixed organisms were noted in 30.59% of cases. Culture was sterile in 37.76% of cases. Desa L.A. et al<sup>7</sup> reported microbes in 86.91% of his cases with E. Coli predominance in 38.46%, Kachroo R. et al<sup>9</sup>, found positive culture in 44% of cases. The commonest organism found in all other studies was E. Coli.

**Dullness of liver:** Liver dullness was obliterated in 66.33% of cases. X ray abdomen showed gas under the diaphragm in 105 cases (70.55%). X ray was not taken in 24 cases. X ray diagnosis was accurate in 92.85% cases of perforations due to peptic ulcer and 70% in ileal perforations. It was not helpful in septic abortion peritonitis. Desa et al<sup>7</sup> found gas under diaphragm in 80-100 hollow organ perforations and he reports that abdominal paracentesis to be superior diagnostic tool than x ray abdomen in early ileal perforations. Kachroo et al found obliterated liver dullness in all their cases of upper gastro intestinal perforations and gas under diaphragm. Similar findings were observed in Almeir et al and Belding studies. In GI perforative peritonitis, peritoneal tapping is much useful compared to x ray abdomen.

**Aetiology:** Commonest cause of peritonitis in the study was peptic ulcer perforation (44.91%) and ileal perforation is the second common cause. Long et al 1970 observed in his study, peptic ulcer peritonitis was the common cause. Desa L.A. et al in their study observed duodenal ulcer peritonitis was the common cause (52.29%). Primary peritonitis was observed in the study 5.39%. Narasimha Rao K.L. et al<sup>13</sup> observed in children (22%).

**Surgical procedures:** 3 out of 170 cases, were not done surgery due to unfit for surgery. Desa et al 1983 observed 3 cases in 161 cases not fit for surgery. All the remaining cases, treated with flank drainage. Suturing was done in 52 duodenal perforations and 7 cases in ileal perforations. Primary peritonitis cases treated with peritoneal drainage in the present study and it is similar to the study done by Desa L.A et al<sup>7</sup>, Kachroo R et al<sup>9</sup>, Tripathi M.D. et al<sup>18</sup> and Kularkarni S.H. et al.<sup>11</sup> In generalized peritonitis, operative treatment was preferred in place of conservative treatment by Kachroo R et al<sup>9</sup>, Tripathi M.D. et al<sup>18</sup> and Treichman et al.<sup>17</sup> Drains were used in the study in all cases of the study. Drains were used in all the cases of peritonitis in the present study. Budharaja et al (1973)<sup>4</sup>, Fee et al (1977), Heu et al (1978), Kachroo R et al (1984)<sup>9</sup> and Dandapat M.C. et al<sup>6</sup> used drains successfully and advised biopsy from the perforated edges wherever necessary. Similarly they recommended drainage only, if the primary focus could not be removed.

**Complications:** In the present study, in 27 cases stitch ab-

cess was observed followed by wound infection in 22 cases. Fecal fistula was observed in 10 cases. Similar complications and their incidence was observed in the studies conducted by Desa LA et al (1983)<sup>7</sup>, Kachoor R et al (1984)<sup>9</sup>, V.K. et al (1988)<sup>19</sup> and Tripathi M.D. et al (1993).<sup>18</sup>

**Mortality rate:** In western countries there has been a marked reduction in morbidity and mortality on account of peritonitis. The factors responsible for this have been a better understanding of pathology, fluid and electrolyte balance, advances in anesthesia and antibiotic therapy (Long et al 1970)<sup>12</sup> early and precise assessment of clinical and laboratory parameters as well as adequate treatment or of great importance for saving patient's life ( Pranchev N et al 1995)<sup>15</sup> however studies from our country have shown that the mortality from this condition which obtained presence as an emergency remains quite high.

In our studies the overall mortality was 20.58% of diffuse peritonitis cases. It is high compared to Kachoor R et al (1984)<sup>9</sup> who observed mortality of 9% among their 90 cases of peritonitis. Mortality in the present study is comparable with mortality of 24.84% by Desa et al (1983), 16.1% reported by Dandapath M.C. et al (1991)<sup>6</sup> and (20.50%) reported by Tripathi M.D. et al (1993)<sup>18</sup> in their 160 cases of peritonitis.

Mortality in the present study varied according to the duration of presentation to the hospital. Dandapath M.C. et al (1991)<sup>6</sup> reported 6% of death rate those reported within 24 hours. It increased to 80% those reported delay of more than 72 hours. Tripathi M.D et al (1993) reports 12.8% mortality rate in those presented in less than 3 days, increased to 57.14% with time delay of 4-6 days and 75% for those who presented after 7 days.

The mortality rate in the present study was high in typhoid perforative peritonitis cases (40%) which is similar to that of 46% reported by Tripathi M.D. et al (1993).<sup>18</sup> They also observed increasing mortality in old age group than in younger age group.

Average hospital stay in the present study was 16.8 days with 5 patients getting discharged with in 10 days and 97 patients stayed for 11-20 days. 20 patients stayed for 21-30 days and 11 patients stayed more than 31 days. Tripathi M.D. et al (1993)<sup>18</sup> observed 11-20 days hospital stay in 51% of their cases with mean stay of 14 days. In their series 22.5% of cases were discharged in less than 10 days.

## CONCLUSION

Males were affected more and the ratio was M:F 4.15:1. The peak incidence of peritonitis was observed in 20-50 years age group (49%). Pain, vomiting, distension and fever were the common symptoms in the study. Diagnosis was done based on clinical findings. Lab investigations were done to support the diagnosis. Evidence of pneumoperitoneum in radiological examination was seen in 71.91% of cases. Inflammation of peritoneum, exudates and perforation of hollow organ were observed at the time of surgery.

Simple closure of perforation was done in 50% of cases. Severe toxemia and hypotension were the causes in 35 cases

of died. Malignancy in edge biopsy was observed in 4 cases and TB in 2 cases. In exudate, E. Coli and Klebsiella were the common organisms found on culture. Average hospital was in the study (16.8 days) in 72.93% of cases. The overall mortality was 20.58%. The mortality was directly related to the time of presentation of case. Early presentation (2.86%) and in late presentation (46.67%) were the mortality pattern of cases.

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# Study of QT – Dispersion in ECG in Patients with Acute Cerebrovascular Accidents or Stroke

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## ABSTRACT

**Introduction:** QT – dispersion represents interlead variability of QT interval and reflects heterogeneity of myocardial repolarization. Abnormalities in electrocardiogram are common in acute cerebrovascular events (CVA) like ST and T wave changes. However, changes in QT – dispersion are also reported recently. Objective of the study was to study of QT – dispersion in patients who have an acute stroke and its co-relation with duration of stroke, type of stroke (Ischemic or hemorrhagic), lesion extent and localization and also study of prognostic value of QT dispersion in acute stroke patients.

**Material and methods:** We included 100 patients of acute stroke with no previous history of sign and symptoms of cardiovascular disease. 100 control age and sex matched subjects were also taken. 12 lead ECGs were recorded within the first 24 hours (24 hour ECG) and between 72- 120 hours (72 hour ECG) from stroke onset. QTc (corrected QT interval) was assessed by single observer blinded to the clinical data.

**Results:** In our study, QTcD was increased significantly in the 24 hour ECG in patients compared to control and QTcD decreased and became comparable to controls at 72 hours. QTcD was also significantly higher in patients with hemorrhagic lesion compared to infarct and in patients with a large lesion compared to a small lesion but there was no significant differences found between right sided and left sided lesion. In our study, we also found that QTcD was higher in death patients in compared to discharge or lama patients.

**Conclusion:** This study shows that QTc dispersion increases in patients with acute stroke and the increases was more prominent in patients in the early period of stroke, patient with hemorrhagic lesion and patients with a large lesion.

**Keywords:-** QT – dispersion, acute cerebrovascular accidents, stroke.

## INTRODUCTION

Cerebrovascular diseases include some of the most common and devastating disorders: ischemic stroke and hemorrhagic stroke. Stroke is second leading cause of death worldwide. The incidence of cerebrovascular diseases increases with age. A stroke, cerebrovascular accident, is defined as an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause.<sup>1</sup>

QT dispersion is defined as the difference between the maximum and minimum QT intervals on a surface ECG. QTcD is the measurement when the QT intervals have been corrected for heart rate.<sup>2</sup> A multitude of ECG changes<sup>3,4</sup> have been observed who presented with acute strokes, both ischemic

and hemorrhagic. In particular, repolarization changes, such as prolongation in the QTc interval have been noticed in as much as 90% of unselected stroke victims.<sup>4</sup> Ischemic like and repolarization ECG changes that occur in patients with acute stroke have been thought to be due to neural myocardial stunning, changes in autonomic nervous system, and catecholamine mediated injuries.<sup>5</sup>

QTD was demonstrated as an independent predictor of functional outcome and mortality following acute neurological events.<sup>6</sup> One report attributed the increase QTD to associated myocardial injury in patients with acute neurological events.<sup>7</sup>

Central nervous system mediated increase in sympathetic and vagal tone are proposed to mediate the observed cardiac abnormalities. Acute stroke is reported to increase QT dispersion within 24 hours in patients without preexisting cardiovascular disease.<sup>8</sup> In patients hospitalized with cerebrovascular accidents, QT dispersion may reflect either neurologic injury or underlying heart disease and is proposed to serve as a predictor of functional outcome and mortality following acute neurologic events.<sup>6</sup> Increased QTc dispersion was found to be an independent predictor for in hospital mortality.<sup>9</sup>

## MATERIALS AND METHODS

This was a study of 100 patients who were admitted to N.S.C.B. medical college and Hospital, Jabalpur with diagnosis of acute stroke between October 2014 to October 2015. 100 control age and sex matched subjects were also included. We recorded 12 lead ECGs within the first 24 hours (24 hour ECG) and between 72- 120 hours (72 hour ECG) from stroke onset. QTc (corrected QT interval) assessed by single observer blinded to the clinical data.

We included Patients older than 18 years hospitalized for acute cerebrovascular events who Presenting within the first 24 hours of symptom onset, those without any history or sign of cardiac disease and evidence of stroke on head CT scan or MRI Brain.

Patients who presented after 24 hours of symptom onset

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were excluded. Similarly, the patients who died before 72 hours of symptom onset, who has lacunar stroke or had transient ischemic attack (TIA) were excluded. All patients having a history of coronary artery disease, valvular heart disease, heart failure, cardiac arrhythmia, patients with bundle branch block, cardiomyopathy. Patients taking any drug known to affect cardiac repolarization like digoxin, anti-arrhythmics, phenothiazine, tricyclic antidepressants, lithium carbonate, erythromycin, theophylline, and levodopa and patients with electrolyte imbalance (serum potassium and/or calcium levels) were excluded.

Simultaneous 12 lead ECGs were recorded within the first 24 hours (24h-ECG) and again between 72 - 120 hours (72h-ECG) after stroke onset following neurologic stabilization of the patients. The QT intervals manually measure and defined as the distance between the start point of the QRS complex to the end point of the T wave and T wave's end point at the isoelectric line. If the U wave present, then the lowest point of T and U wave junction we accepted as the end of QT interval. Corrected QT (QTc) we calculated by the Bazett<sup>10</sup> formula ( $QTc = QT / (RR)^{1/2}$ ). ECG with 9 or more leads having measurable QT interval were taken. Corrected QT dispersion (QTcD) is defined as maximum minus minimum QTc interval.

A complete neurologic examination performed on enrollment in the study and after 72 hours. Patients who admitted with acute stroke undergone for CT or MRI brain.

Subtypes of stroke are defined as lacunar infarct (LACI), total anterior circulation infarct (TACI), partial anterior circulation infarct (PACI), and posterior circulation infarct (POCI) according to the classification made by the Oxfordshire Community Stroke Project (OCSP). Patients with hemorrhagic stroke classified as having either a large hemorrhage (>33mm) in diameter, with or without ventricular extension) or a small hemorrhage (< 33mm).

Results from patients with total anterior circulation infarct and large hemorrhage compared with those from patients with partial anterior circulation infarct and small hemorrhage to determine the effect of lesion size. Results from patients with right sided lesion (all subtypes together) we compared with those for patients with left sided lesions to assess the laterality effect.

## STATISTICAL ANALYSIS

Qualitative data was represented in the form of frequency and percentage. Association between qualitative variables was assessed by chi-square test with continuity correction for all 2 X 2 tables and Fisher's exact test for all 2 X 2 tables where p-value of chi-square test was not valid due to small counts. Quantitative data was represented using mean±SD. Analysis of Quantitative data between the two groups was done using unpaired t-test if data passes 'Normality test' and by Mann-Whitney Test if data fails 'Normality test'. SPSS software Version 20 was used for analysis.

## RESULTS

The present study included 100 patients of acute stroke above

18 years of age. Patients likely to have any other cause of altered QT dispersion were excluded as per exclusion criteria. The patients were subdivided into various subgroups; whether having hemorrhagic lesion (N=42) or ischemic lesion (N=58), whether lesion was right sided (=51) or left sided (=49), whether lesion was small (N=52) or large (N=48).

In our study, out of 100 patients, 56 were males and 44 were females. Most patients in study population were in the age group of 50 to 59 followed by 60 to 69 years. Out of 100 patients, 58 patients died and 42 survived. Hypertension (98%), smoking (43%), dyslipidemia and alcoholic (27%), and diabetic (15%) were common co-morbid conditions in patients.

The QTcD at 24 hour ECG was significantly higher than control and 72 hour ECG, but there was no significant differences (p value= 0.37) between QTcD at 72 hour ECG in patients ( $51.06 \pm 19.24$ ) and control ( $48.83 \pm 15.61$ ). The mean value of QTcD was significantly higher in patients with a large lesion compared to patients with a small lesions ( $98.90 \pm 20.08$  Vs  $83.10 \pm 17.12$ , p value $\leq 0.001$ ). Patients with a hemorrhagic lesion had higher QTcD than the patients with ischemic lesion ( $101.88 \pm 22.52$  Vs  $82.57 \pm 13.54$ , p value $\leq 0.001$ ).

In 1st day ECG QTcD, there was no significantly differences between right sided and left sided lesion ( $87.51 \pm 17.12$  vs  $93.98 \pm 22.65$ , p value=0.11). In 3<sup>rd</sup> day ECG QTcD in acute stroke patient there was no significant difference between large lesion and small lesion, Right sided lesion and left sided lesion, hemorrhagic and ischemic lesion. QTcD was higher in death patients in compared to discharge or lama patients ( $100.02 \pm 18.12$  vs  $77.79 \pm 15.28$ ).

## DISCUSSION

The present study is prospective observational study to evaluate QT dispersion in acute stroke patients and it's prognostic value in acute stroke patients.

Most of the patient in the study population were in the age group of 52 – 59 years followed by 40 – 49 years age group. A study in department of medicine, Government Medical College and New Civil Hospital, Majura gate, surat. R.P. Eapen, J.H. Parikh, N.T. Patel<sup>11</sup> found that in stroke patients common age group was 51 - 60 years. Another study by Naik M. Rauniyar R.K. Sharma U.K. et al<sup>12</sup> who found mean age of 58.27 yrs.

The incidence of stroke is maximum in the age group of 50 – 59. It also correlates with the findings of Wadhawani et al<sup>13</sup> who found highest incidence in the age group 51 – 60. Aiyar

Study	Common age group
Our study	50-59
R. P.Eapen, J. H. Parikh et al <sup>11</sup>	51-60
Naik M. Rauniyar R. K. Sharma U.K. et al <sup>12</sup>	Mean age 58.27
Wadhawani et al <sup>13</sup>	51-60
Aiyar et al <sup>14</sup>	51-60
Pinhero et al <sup>15</sup>	Mean age 54.85

**Table-1:** Incidence of age in stroke patients

Etiology	Present study	R.P.Eapen, J.H. Parikh et al <sup>11</sup>	Aiyar et al <sup>14</sup>	Sotaniemi et al <sup>16</sup>	Yitzchok S. Lederman et al <sup>17</sup>
Infarcts	58%	68%	70%	66.2%	59%
Hemorrhage	42%	32%	30%	33.8%	41%

**Table-2:** Incidence of pathological lesions in cerebrovascular disease

	24- hour ECG	ECG	P Value
	Large Lesion N= 48	Small Lesion N= 52	
QTcD (ms)	98.90±20.8	83.10±17.12	<0.001 [significant]
	Right Sided Lesion N=51	Left Sided Lesion N=49	
QTcD (ms)	87.51±17.12	93.98±22.65	0.11[ns]
	Hemorrhagic Lesion N=42	Ischemic Lesion N=58	
QTcD (ms)	101.88±22.52	82.57±13.54	<.001 [significant]
	72 hour ECG	ECG	
	Large Lesion N= 48	Small Lesion N= 52	P Value
QTcD (ms)	98.90±20.8	83.10±17.12	<0.001 [significant]
	Right Sided Lesion N=51	Left Sided Lesion N=49	
QTcD (ms)	87.51±17.12	93.98±22.65	0.11 [ns]
	Hemorrhagic Lesion N=42	Ischemic Lesion N=58	
QTcD (ms)	101.88±22.52	82.57±13.54	<.001 [significant]

**Table-3:** QT Dispersion (QTcD) According To Stroke Type And Lesion Localisation In 24 and 72 Hour ECG

et al<sup>14</sup> also found highest in age group 51 – 60 which comprised this finding also similar with the study done by Pinhero et al<sup>15</sup> who found mean age 54.85 years. (Table No.1) In this study, out of 100 cases, 56% were male and 44% were female. A study in department of medicine, Government Medical College and New Civil Hospital, Majura gate, surat. R.P. Eapen, J.H. Parikh, N.T. Patel<sup>11</sup> also found that the cerebrovascular stroke are common in male (67%) than female (33%) . In this study male to female ratio was 2:1. In another study Aiyaret al<sup>14</sup> found that male to female ratio 1.9:1. So we can conclude that the incidence of stroke is more common in malesex. This finding also correlate with the study done by Aiyar et al<sup>14</sup> and Pinhero et al<sup>15</sup> who found the incidence of stroke is more common in males than females. In our study 98% were hypertensive, 43% cases were smokers, 27% cases were alcoholics and 27% cases have dyslipidemia and 15% cases have diabetics. A study in department of medicine, Government Medical College and New Civil Hospital, Majura gate, surat. R.P. Eapen, J.H. Parikh, N.T. Patel<sup>11</sup> also found that most com-

mon risk factor was hypertension, alcoholism, smoking and hyperlipidemia. Another study by Naik M, Rauniyar R.K., Sharma U.K. et al<sup>12</sup> who found hypertension was a most common risk factor in acute stroke patients.

In our study out of 100 patients, 58 cases had infarct and 42 cases had hemorrhagic lesion. A study in department of medicine, Government Medical College and New Civil Hospital, Majura gate, surat. R.P. Eapen, J.H. Parikh, N.T. Patel<sup>11</sup>found that 68 patients had cerebral infarction and 32 patients had hemorrhagic stroke. Another study done by Aiyar et al<sup>14</sup> who found clinical diagnosis of infarction in 70% cases and Sotaniemi K. A. et al<sup>16</sup> who found 66.2% infarct and 33.8% hemorrhage. Another study done by Yitzchok S. Lederman<sup>17</sup>, BA, Clotile Balucani, MD,PHD, Jason Lazar, MD, MPH, Leah Steinberg, M, James Gugger, PharmD, Steven R Levine, Found that In total 888 stroke patients: 59% ischemic 41%hemorrhagic (Table No.2) .

In the present study we found that QTcD was significantly higher in patients at 24 hour ECG than controls and QTcD value become comparable to controls at 72 hours. We also found that the mean value of QTcD was significantly higher in patients with large lesion compared to patients with a small lesion, Patients with hemorrhagic lesion had higher QTcD than patients with ischemic lesion and there was no significantly difference between right sided and left sided lesion (Table No.3) .

A study done by SN Chug, Arvind Garg, Amit Yadav,Saurabhi Yadav<sup>18</sup> in 2011, also found that QTcD was higher in patients with large lesion compared to patients with small lesion, this study also found that QTcd was higher in patients with hemorrhagic stroke than patients with ischemic lesion. Another study by Lazar et al<sup>19</sup>; also reported similar results. Randell et al<sup>20</sup> also reported that patients with subarachnoid hemorrhage have increased QTcD compare with controls.

A study by Nazire Afsar<sup>21</sup>, MD also found that QT dispersion is increased in the first 24 hours in patients with acute stroke and no cardiovascular disease compared with the control group. Although this finding seems to be related to the size of the lesion rather than to the stroke localization. Another study by Lazar et al<sup>19</sup>; also noticed that QTcD was higher in patient with intracerebral hemorrhage as compared to ischemic lesion.

Similarly in the study group, both QTD and QTcd values on first hospitalization day were significantly higher than the respective value on the third day (p,0.001 for both) but no significant differences were found between right and left sided subgroups, regarding QT interval measurements, whether on the first or third day (p> 0.05 for all) . In this study we found that QTcD was higher in death patients (100.02 ± 18.12) in 1st day ECG in compare to discharge or lama patients (77.79±15.28) .

## CONCLUSION

There was no significant difference in QTcD in acute stroke patient between right sided and left sided lesion and this study also shows the value of QTcD in predicting patients prognosis with early stage of acute stroke patients. As increased QTcD could represent a substrate for arrhythmias, close ECG monitoring of stroke patient during the acute phase could be advantageous.

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# Rare Presentation of Ewings Sarcoma in Sinonasal Region: A Case Report

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## ABSTRACT

**Introduction:** Ewings sarcoma (ES) is highly malignant round cell tumor of childhood and infancy. It has both skeletal and extra skeletal manifestations. It most commonly involves long bones and extra skeletal forms generally involve soft tissues of extremities, retroperitoneum, paravertibral tissues and rarely head and neck region. Involvement of sinonasal region is very rare and few cases were reported till date.

**Case Report:** We report a case of Ewings sarcoma involving sinonasal region in 34 year old male, who presented with epistaxis, nasal obstruction and pain in facial area. He was received conformal radiotherapy to stop epistaxis and followed by chemotherapy. Patient responded subjectively and objectively.

**Conclusion:** The small round cell tumors like olfactory neuroblastoma, lymphoma, undifferentiated carcinoma, sinonasal melanoma, acute leukemia, embryonal rhabdomyosarcoma, sinus mesenchymal chondrosarcoma, osteosarcoma small cell and small neuroendocrine cell carcinomapose difficulties in diagnosis and management. Therefore, this study aims to focus on the features of ES and other small round cell tumors and the differentiating features for the accurate diagnosis and proper treatment. We present this case due to its rare presentation and few cases were reported till date and also to focus on the clinical, histopathological and immunohistochemical features, to differentiate among all the round cell tumors for accurate diagnosis and proper treatment.

**Keywords:** Ewings Sarcoma, Sinonasal Region, Radiotherapy, Chemotherapy.

## INTRODUCTION

Ewings sarcoma (ES) is highly malignant round cell tumor which originates from mesenchyme.<sup>1</sup> It can arise from bone (skeletal) as well as soft tissues (extra skeletal). Skeletal forms are more common than extra skeletal forms which most commonly involves long bones of extremities. Extra skeletal forms mostly involve soft tissues of extremities, retroperitoneum, paravertibral tissues and rarely head and neck region.<sup>4</sup> The incidence in head and neck region is 2-7% and frequently involves maxilla and mandible.<sup>2</sup> Involvement of sinonasal region is very rare and few cases were reported till date. ES belongs to family of blue, small round cell tumors which have different clinical manifestations. They pose difficulties in diagnosis and management. Therefore, this study aims to focus on the features of ES and other small round cell tumors and the differentiating features for the accurate diagnosis and proper treatment.

## CASE REPORT

A 34 year old male presented to oncology OPD with chief complaints of epistaxis, pain in right side of face and nasal obstruction. He was examined thoroughly. No growth was seen in nasal cavity and tenderness noted in right malar area. Slight swelling was noted in right cheek. Oral cavity, oropharynx and neck examination was normal. He was further investigated with CT Scan Head and Neck, which showed large lobulated sino nasal mass seen predominantly in maxillary sinus extending into nasal cavity and sphenoid sinus with bony erosion. Mass is also involving right inferior turbinate and extending into infra temporal fossa (Fig 1 and 2) Biopsy was taken from the mass and histopathology revealed collections of monotonously appearing small round cells with hyper chromatic nuclei and scant cytoplasm (Fig 3 and 4). Immunohistochemistry was positive for Mic-2 (CD 99) and CD 56. Viamentin was focally positive. IHC was negative for chromogranin, synaptophysin, CD 45, Desmin, Neuron specific enolase (NSE) and Pan cytokeratin. It was also negative for MYOD 1 and CD 138. Haematological and biochemical investigations were normal. Chest radiograph and ultrasound of abdomen and pelvis were normal. Finally, it was diagnosed as Ewings Sarcoma of Sinonasal region. Patient complaining of recurrent episodes of epistaxis for which we forwarded with upfront conformal radiotherapy to stop bleeding. There was improvement both subjectively and objectively.

Patient is now on chemotherapy with VAC/IE regimen for total of 12 cycles. (vincristine, adriamycin, cyclophosphamide, iphosphomide, etoposide)

## DISCUSSION

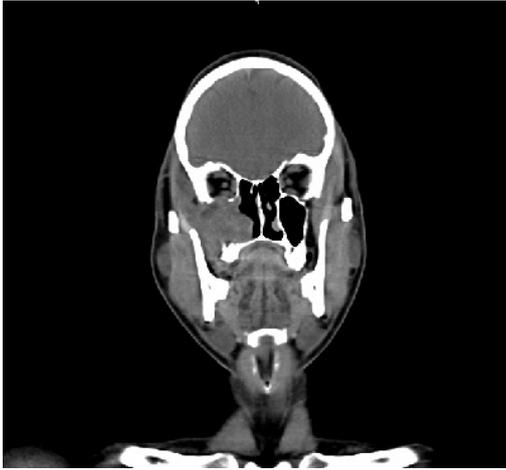
ES Family Tumors include tumors with varied histology. They have different ultrastructural and immunohistochemical features too. James Ewings described Classic ES in 1921, as monotonous population of small round cells with high nuclear to cytoplasmic ratios arrayed in sheets.<sup>1</sup> The cells

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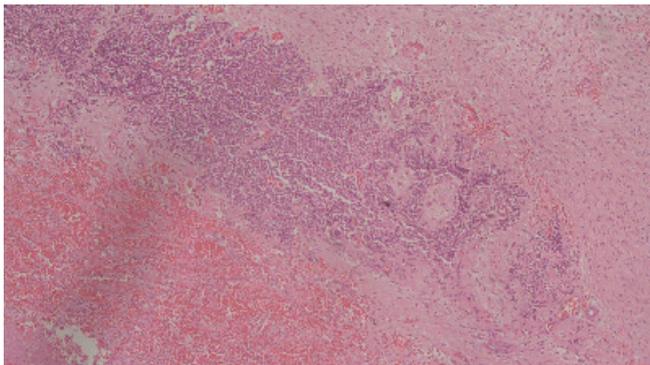
Tumor	Clinical features	Microscopy	IHC
Neuroblastoma	Solid tumor of infancy and childhood	Uniform small round cells with indistinct borders, arranged in nests and sheets having sparse cytoplasm, round nuclei, Higher-grade tumors with nuclear pleomorphism, prominent nucleoli, increased mitotic activity, Rosettes of the Homer Wright type (pseudorosettes) in up to 30% of tumors, and Flexner-Wintersteiner type (true neural rosettes) in 5%.	Positive: Neuron specific enolase (NSE), Synaptophysin, Neurofilament protein(NFP), Class III beta-tubulin, and Microtubule-associated protein (majority of cases). S-100 protein staining limited to the sustentacular cells situated along the periphery of the neoplastic lobules (may be sparse in the higher-grade tumors)
Desmoplasticsmall round cell tumor	Tumor of infancy and childhood	Small round cells with hyperchromatic nuclei and increased nuclear cytoplasmic ratio	Positive: Cytokeratin, Desmin, Vimentin, Neuron specific enolase.
Medulloblastoma	Childhood tumor	Small round cell tumor with sheets of undifferentiated cells with hyperchromatic nuclei and increased nuclear cytoplasmic ratio	Positive: NSE, Synaptophysin, Focal GFAP(glial fibrillary acidic protein)
Rhabdomyosarcoma	Children and young adults	Cells of variable size and shape which stain deep blue,small cytoplasmic vacuoles,Strap cells or tadpole cells strongly associated with RMS	Positive: Desmin, Muscle specific actin, Myoglobin and MyoD1.
Synovial sarcoma	Adolescents and young adults.	Tumor cells were small to medium in size, with rounded, ovoid, or fusiform bland nuclei with inconspicuous nucleoli. Small glandular or acinar-like structures were seen in some biphasic variant cases. The cytology of the small cell variant of synovial sarcoma shows numerous, small round cells with high nucleocytoplasmic ratio	Negative: Cytokeratin and Epithelial membrane antigen. Diagnosed mainly by presence of t(X:18) translocation by molecular techniques.
Wilms tumor	Childhood tumor of kidney	Cells have scanty deep blue cytoplasm with ill defined borders round to oval nuclei having fine, regular, evenly distributed chromatin.	Positive: Cytokeratin, NSE, Epithelial membrane antigen and Vimentin.
Retinoblastoma	Childhood eye tumor	Sheets and nests of small blue cells with scanty cytoplasm, hyperchromatic nuclei. Rosettes of the Homer Wright type and Flexner-Wintersteiner type	Positive: NSE, Synaptophysin, S-100,Leu-7, Myelin basic protein, GFAP(glial fibrillary acidic protein).
Small cell lymphoma	Old age tumor, male	Small round mature lymphocytes and polymorphocytes.	Positive: CD-5,CD-9,CD-20,CD-23,CD-43 and CD-79a.
Small cell lung cancer	Old age tumor, male	Sheets,clusters,rosettes of small round to oval cells with minimal cytoplasm, salt and pepper chromatin, hyperchromatic and indistinct nucleoli.	Positive: Pan keratin(100%) TTF1(89%), NSE(77%), CD-117(75%) Chromogranin Synaptophysin, Calretinin, Keratin5.
Mucosal Melanoma	Old age,male	Small uniform blue cells,70% of cells with melanin pigment, nesting growth pattern	S-100, HMB 45, Melan A/Mart1, Tyrosinase, Vimentin.
The main differentiating features among small round cell tumors are as follows:			



**Figure-1:** CT Scan head and neck coronal view showing lobulated mass in sino nasal region



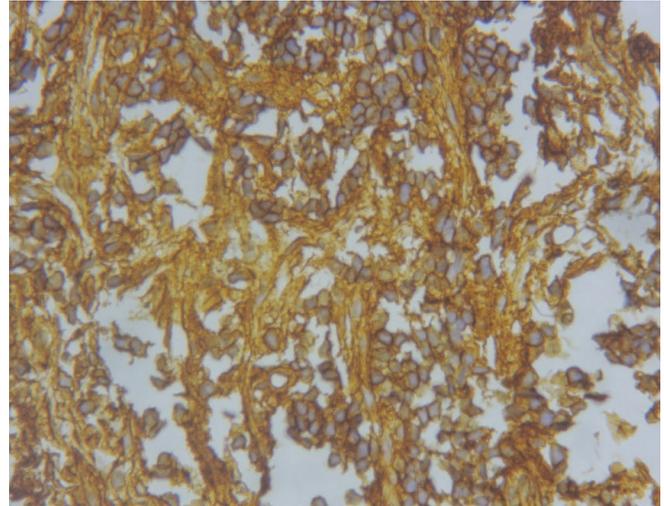
**Figure-2:** CT Scan head and neck axial section showing mass in sinonasal region.



**Figure-3:** Monotonous clusters of small round cell with scanty cytoplasm and hyperchromatic nuclei.

have scant, faintly eosinophilic to amphophilic cytoplasm, indistinct cytoplasmic borders, and round nuclei with evenly distributed, finely granular chromatin and inconspicuous nucleoli.<sup>2</sup>

CD-99 is expressed in most of the ES tumors, which is a cell surface glycoprotein and is a characteristic feature of Ewing's sarcoma. Diffuse membrane staining is positive for CD-99 in a chain-mail pattern in 95-100% of Ewing's sarcoma



**Figure-4:** IHC slide showing cells of CD-99 positivity in high power (40X)

cases.<sup>3</sup> ES is also positive for other cell surface proteins like vimentin sometimes.<sup>4</sup> Peripheral Primitive Neuroectodermal Tumors (pPNET) which are more differentiated variety of ES Family Tumors express markers like NSE (neuron specific enolase), S-100 protein, Leu-7 which shows evidence of neural differentiation.<sup>6</sup> 20% of cases of ES are immune reactive for cytokeratin focally and 10% of cases show diffuse immunoreactivity.<sup>7</sup>

Ewing's sarcoma is characterized by a reciprocal chromosomal translocation between chromosomes 11 and 22. It is considered as the pathognomonic feature of Ewing's sarcoma as it is present in 85% of tumors. Other translocations involving chromosomes like 22q12, 21q22, 7p22, 17q12, and 2q36 are seen in rest of the cases.<sup>8</sup> The rearrangement results in the translocation of the 3' portion of the friend leukemia virus integration site 1 (FLI1) gene from chromosome 11 to the 5' portion of the Ewing's sarcoma gene EWS on chromosome 22. As result of this translocation, a chimeric EWS-FLI1 RNA is expressed which results in a fusion protein.<sup>9</sup> This is useful for molecular detection methods like RT-PCR and FISH. The presence of t(11;22) (q24;q12) is present in 85% of ES cases and found to correlate with high expression of CD-99. About 15% of histopathologically defined CD99 positive Ewing's sarcomas lack the classical Ewing's sarcoma-specific translocation.<sup>10</sup>

As the histologic and immunophenotype characters of ES overlap with other small round cell tumors, an expanded panel of immunohistochemical studies may be required to rule out other entities. Olfactory neuroblastoma is also positive for NSE, S-100, and Leu-7 like Ewing's sarcoma but it is negative for vimentin and immunoreactive for neurofilament protein. Lymphoblastic lymphoma is also strongly positive for CD-99 but it is also immunoreactive for leukocyte common antigen (CD45) which is not seen in ES. Rhabdomyosarcoma is also focally positive for CD-99 and is also immunoreactive for myogenin, myoD1, desmin, and actin which is not seen in ES. The differentiation between poorly differentiated synovial sarcoma and Poorly differentiated Ewing's sarcoma is difficult sometimes as both express same

markers like CD-99.

In our case, the histology showed small round cell tumor with hyperchromatic nuclei and scant cytoplasm. IHC was positive for MIC-2(CD-99) and CD-56. Vimentin was focally positive. Olfactory neuroblastoma was ruled out as the tumor was not arising from cribriform plate and superior turbinate as well as the histologically there were no Homer wright rosettes which are characteristic features of neuroblastoma. Moreover the tumor is negative for NSE. Rhabdomyosarcoma is ruled out as it is most common in children, histologically small round cells should present in subepithelial layer and IHC is positive for Myo-D. By the above features the Rhabdomyosarcoma is ruled out. Sinonasal melanoma was ruled out due to absence of prominent eosinophilic nucleoli, absence of melanin pigmentation and negativity for HMB45. Lymphomas especially lymphoblastic type can be confused with ES and it was ruled out by absence of single prominent nucleoli and CD45 negativity. Synovial sarcoma is ruled out due to absence of cytokeratin and presence of CD-99. Medulloblastoma is ruled out by location of tumor, age and CD-99 positivity.

## CONCLUSION

Small round cell tumors of sinonasal region pose difficulties in diagnosis and management. Thorough knowledge regarding the clinical features, microscopy and immunohistochemistry would help accurate diagnosis and proper management.

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## Tumoral Calcinosis- A Rare Case Report

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### ABSTRACT

**Introduction:** Tumoral calcinosis is a rare condition of unknown etiology. It's a misnomer as they are not true neoplasms characterized by deposition of calcium in soft tissues in periarticular location. Only few cases have been reported.

**Case report:** Herein we report a case of tumoral calcinosis in a fifteen year old girl with no metabolic abnormalities. Patient was successfully treated with wide local excision and the diagnosis was confirmed by histopathology.

**Conclusion:** Tumoral calcinosis is a hereditary disease of phosphate metabolic dysfunction but is commonly mistaken for a lesion. The most effective treatment is a combination of surgical excision, phosphate deprivation, and use of acetazolamide. In this case as phosphate levels were within normal limits wide local excision was done.

**Keywords:** Tumoral calcinosis, Misnomer, Calcium Deposition, Periarticular Unknown etiology.

### INTRODUCTION

Tumoral calcinosis is a rare condition of unknown etiology wherein there is calcium deposition in the soft tissue in periarticular location i.e. around joints. It's a MISNOMER. The name indicates calcinosis (calcium deposition) which resembles tumor (like a new growth). They are not true neoplasms - they don't have dividing cells. They are just deposition of inorganic calcium with serum exudate. Children and adolescents (6 to 25 years) are the most commonly affected. They are more common around shoulders, hips and elbows.<sup>1</sup>

### CASE REPORT

A 15 year old female patient presented to surgical outpatient department with complaints of swelling in the left gluteal region since 6 months. No history of pain associated with the swelling, sudden increase in size of swelling, anorexia, significant weight loss, trauma, restriction of joint movements. No history of similar swellings in the family.

On examination a single, vertically oval, 15x10 centimeters, smooth, firm, non-tender, mobile(both directions)swelling present in the left gluteal region extending into the lateral compartment of the thigh. Skin over the swelling pinchable, no restriction of hip joint movements, neurovascular integrity distal to swelling maintained, no palpable regional lymph nodes. Clinical diagnosis of soft tissue sarcoma was made, fine needle aspiration cytology was inconclusive, core needle biopsy showed calcifications with fibro-collagenous stroma and giant cell reaction without signs of malignancy suggestive of tumoral calcinosis.

Radiological investigations were done which supported our histological diagnosis

X ray Pelvis: reveals evidence of large fairly well defined lobulated lesion with ring like calcifications seen in the soft tissue overlying the left upper end of the femur without periosteal reaction and no adjacent joint involvement.

CT scan: shows a large mass lesion with calcifications and hypo dense soft tissue areas with 20-30HU values. No obvious involvement of adjacent bone. (Fig 1)

MRI: Revealed multiple locules of hyper intensity interspersed with hypo intensity areas (Fig 1)

Laboratory investigations were found to be within normal limits (including serum calcium and phosphorus). Final diagnosis of tumoral calcinosis was made and surgery was planned.

### SURGERY

Wide local excision was done and specimen was sent for biopsy which revealed lobular calcifications with giant cell reaction and psammoma formations supporting our diagnosis (Fig 2).

Post operative period was uneventful and there was no recurrence upto an year of follow up.

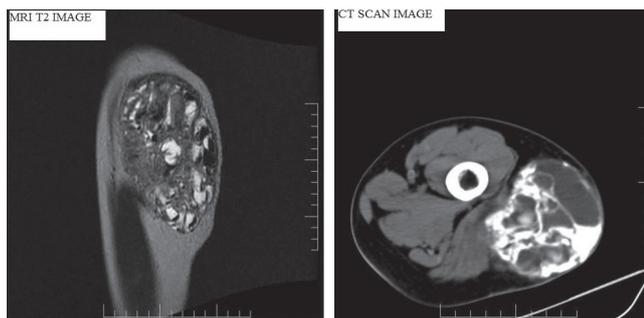
### DISCUSSION

The term Tumoral calcinosis defines a condition in which either single or multiple tumor-like calcified masses are present without any associated calcium metabolism disorder. Calcium deposition in the soft tissue in periarticular location i.e. around joint. It's a MISNOMER. The name indicates calcinosis (calcium deposition) which resembles tumor (like a new growth). They are not true neoplasms - they don't have dividing cells. They are just deposition of inorganic calcium with serum exudates. Children and adolescents (6 to 25 years) are the most commonly affected.<sup>1</sup> They are more common around shoulders, hips and elbows. The term tumoral calcinosis was originally described by INCLAN in 1943.<sup>2</sup> The pathogenesis of Tumoral Calcinosis remains unclear and several theories have been proposed. Hyperphosphatemia has been described in some patients<sup>3,4</sup>, while local trauma has been implicated in a few cases.<sup>5</sup> No metabolic abnormalities were found in our patient and she denied any history of local trauma. The clinical presentation and radiological

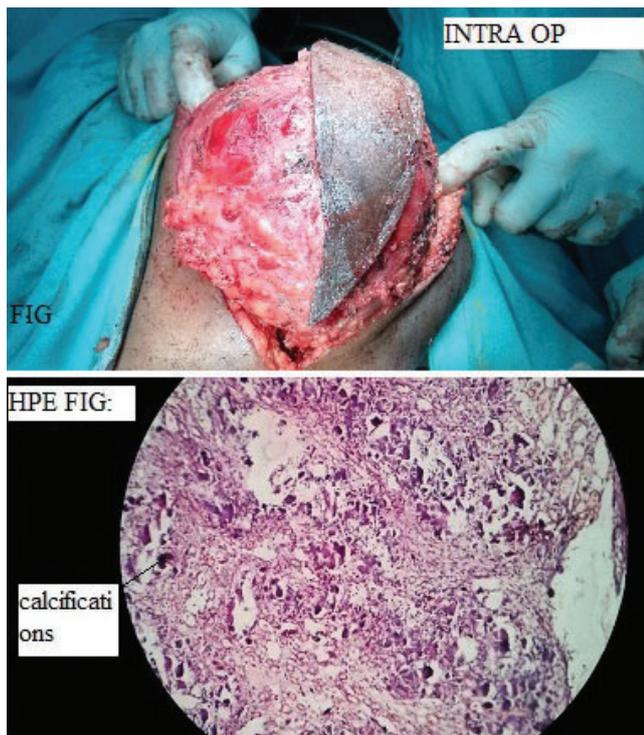
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**Figure-1:** MRI and CT image



**Figure-2:** Intra-op and HPE pics

features are typical confirmed by pathological examination. Investigations such as CT scan and MRI are very useful in diagnosing this entity.<sup>6,7</sup> Histopathological examination serves as an important diagnostic tool in diagnosing tumoral calcinosis and differentiating it from other lesions mimicking it. It is characterized by a central mass of amorphous or granular calcified material surrounded by hyalinized fibrous tissue separating several cavities. The fibrous tissue is bordered by a granulomatous and chronic inflammatory infiltrate. There may be prominent small psammoma-like bodies or calcospherites.<sup>8</sup> A complete surgical excision along with the deposits is the mode of treatment although recurrences are common.

## CONCLUSION

Tumoral calcinosis is a hereditary disease of phosphate metabolic dysfunction but is commonly mistaken for a lesion. The most effective treatment is a combination of surgical excision, phosphate deprivation, and use of acetazolamide. In this case as phosphate levels were within normal limits wide local excision was done.

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# CBCT based Comparison of Condylar Postion in Hypodivergent and Hyperdivergent Facial Skeletal Pattern

Ajoy Kumar Shahi<sup>1</sup>, Subhash Chandra<sup>2</sup>, Anurag Rai<sup>3</sup>, Amesh Golwara<sup>2</sup>

## ABSTRACT

**Introduction:** Orthodontists have always believed in the appropriate positioning of mandibular condyle in relation to the glenoid fossa, when teeth are in maximum intercuspation. Orthodontic diagnosis and treatment planning are considered on skeletal pattern of the patient.

**Objective** To compare condylar position between hypodivergent and hyperdivergent skeletal patterns.

**Material and Methods:** Diagnostic cone-beam computed tomography images of two groups of 15 subjects, each representing the extremes in facial type, who visited our orthodontic clinic were reviewed. The subjects were divided into two equal groups according to the mandibular plane angle: hypodivergent, and hyperdivergent groups. The total amount of change between the 2 groups was examined using a statistical *t*-test

**Results:** The hypodivergent and hyperdivergent groups showed a statistically significant differences in superior joint spaces.

**Conclusion:** Condylar position vary according to vertical facial morphology. The findings of this study demonstrated significantly lesser Superior joint space for hyperdivergent group as compared to hypodivergent group Therefore, condylar position and joint spaces should considered during assessment of orthodontic cases, the risk of misdiagnosis is high, being significantly higher in patients with the hyper divergent facial pattern

**Keywords:** Cone beam computed tomography, Hypodivergent face type, hyperdivergent face type, Condylar position.

## INTRODUCTION

The ideal position of the condyle in the glenoid fossa during maximum intercuspation is one of the goal of the temporomandibular joint (TMJ) oriented orthodontic treatment planning.<sup>1,2</sup> Although, the occlusion of the patient can be observed directly in the mouth, condylar position in the fossa is unapproachable to the naked eye.<sup>3</sup>

There are several factors that could affect the TMJ morphology and condyle position, such as age, sex, facial growth pattern, pathological/functional alterations, decreased or increased muscular activity, occlusal force, and dental occlusion changes.<sup>4-7</sup>

The condylar position in the glenoid fossa can be determined by the dimension of the joint space. The joint space is a term radiographically used for description of the radiolucent zone seen between condylar and temporal parts.<sup>8</sup>

The use of conventional radiographs to asses TMJ has inherent limitations such as structural superimpositions in two-dimensional imaging, particularly in the region of the

petrous temporal bone, the mastoid process, and the articular eminence, which indeed limits an accurate view of the TMJ.<sup>9</sup> The complex structure of the TMJ makes radiographic examination difficult, and accurate diagnosis requires several types of radiographic images.

Conventional radiologic imaging techniques such as panoramic radiography, TMJ radiography, both open- and closed-mouth transcranial projections, linear tomography, cannot show anatomical relationships exactly, as a result, modern imaging modalities such as MRI and CT are now being used more frequently for radiographic TMJ examination.<sup>9</sup>

Magnetic Resonance Imaging (MRI) is considered as one of the most useful tools that show disc displacement. Unfortunately MRI gives a little information of the bone TMJ structures.<sup>10,11</sup> Computed tomography (CT) provides three-dimensional images of the bony components of TMJ but radiation dose is very high. Cone beam computed tomography (CBCT) allows higher resolution three dimensional imaging of TMJ structures with lower radiation doses than conventional spiral CT.<sup>11,12</sup>

CBCT has several advantages such as lower radiation dose and rapid scan time and reduced image artifact compared to conventional spiral computed tomography. Multiplanar reformatting of the image can be done using CBCT. CBCT technique allows the measurement of the position of condyle in the glenoid fossa with high accuracy. It gives high quality isotropic images of the bony components in all planes<sup>11,12</sup>

Studies focusing on the relation between facial configuration and TMD indicate an association of hyperdivergency with TMD.<sup>13,14</sup> Several studies have been done to establish relationship between facial morphology and condylar position.<sup>15-19</sup> In addition, Condylar displacement of significant magnitude occurs frequently in the asymptomatic population and represents an attempt to compensate for disproportions. Gidarakou found there was an increase in the mandibular plane angle (Go Gn to SN) and an increase in the gonial

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angle of the mandible (Ar-Go-Me) to be associated with increased TMJ internal derangement.<sup>16</sup> Girardot reported a more significant Condylar displacement in hyperdivergent facial morphologies, whereas Burke et al. found diminished upper articular joint spaces in the same facial type.<sup>15,19</sup> Stringent and worms studied the relationship between skeletal pattern and internal derangement. They found greater incidence of internal derangement in hyperdivergent skeletal pattern.<sup>20</sup>

A vertical facial pattern is a factor considered in the condylar-glenoid fossa relation because patients with a long vertical facial pattern exhibit greater divergence of the palatal and mandibular plane influencing condylar rotation, which can be displaced with respect to a group of medium vertical pattern control.<sup>21</sup>

Despite reasonable evidence of Dolichofacial configurations being more prone to articular instability, data related to the subject is scarce and conflicting. For the above reasons, it has been hypothesized that vertical skeletal pattern is a factor influencing condylar position.

However, this information has not been reported yet with data obtained through CBCT imaging. Therefore, the aim of this study was to compare the CBCT-based spatial analysis of the mandibular condylar position as related to hypodivergent and hyperdivergent facial skeletal pattern.

## MATERIALS AND METHODS

All the CBCT images were obtained from previously available diagnostic data from patients currently under orthodontic treatment. These CBCT images were not specifically taken for this study but were already taken through the request of the treating professional for many reasons except TMJ disorder. Informed consents were obtained from each subject before obtaining the records to use their volumetric data of CBCT images for study.

CBCT images of patients (between 14 years and 26 years old) with full permanent dentition at maximum occlusal intercuspation and with dolichofacial (hyperdivergent) and Brachyfacial (hypodivergent) skeletal pattern were obtained for study.

The research protocol was reviewed and approved by Ethical committee of the Institute. Condylar position was studied in two groups of 15 subjects each representing the extremes in facial type. The subjects were patients who reported to our practice. Based on the study criteria, we included individuals, who were between 14 to 26 years of age and facial skeleton characteristics as measured cephalometrically. Age was a criterion for selection since the intention was to study young adult subjects having completed growth or close to completion of growth. Facial skeleton type was determined by using the Jarabak rotation index and mandibular plane angle. Subjects were considered to be hyperdivergent if the posterior- anterior face height ratio (sella – gonion/ nasion- menton) was 59% or less and mean mandibular plane angle was 34 degrees or more. Subjects were considered to be hypodivergent if the posterior- anterior face height ratio (sella – gonion/ nasion- menton) was 65% or more and mean man-

dibular plane angle was 19 degrees or less.

Patients were excluded if they had missing permanent teeth except third molars, grossly carious teeth, restorative treatment, mobile teeth due to advanced periodontitis, crossbite or open bite, functional mandibular deviation due to occlusal interference, previous orthodontic treatment, history, clinical signs and symptoms of TMDs as determined by patients clinical history and clinical examination, previous TMD treatment, evident dental or facial asymmetry, congenital skeletal deformity such as cleft lip and palate, and history of trauma or surgery to the temporomandibular joints. In addition patients were excluded if they had deviation on opening and closure, mouth opening less than 40 mm, Class III malocclusion and Class II div2 malocclusion. It was felt these factors could significantly affect condylar length and / or the occlusion, which could in turn distort data gathered for the study.

The records utilized included clinical history to evaluate TMJ dysfunction, clinical examination, Lateral cephalometric radiograph in centric occlusion, Cephalometric measurements made were Mandibular plane angle (GoGn – SN), Anterior facial height, Posterior facial height, PFH x 100/AFH (Jarabak's ratio).

Cone-beam computed tomography images were taken with the subject in an upright standing position, placing with no chin rest. Head position was adjusted using mid-sagittal positioning laser beam for a central positioning. Temple supports were tightened. No bite blocks were used, and the scan was taken in maximum intercuspation position.

Temporomandibular joints were scanned with Sirona Orthophos XG 3D cone-beam 3D CT System (Sirona, Germany) with a volume size of FOV 8 cm x 8cm. CBCT Protocol was:

- a) FOV: 8cmsX 8cms.
- b) Maximum slices: 511
- c) Slice thickness: 0.16 mm
- d) Peak voltage: 85kVp
- e) Tube current: 5mA
- f) Scan time: 14.2s
- g) Radiation dose: 64µSv

Axial, coronal, sagittal, cross-sectional and 3D images in bone window are generated. The acquired data was reconstructed into MPR image and panoramic projection. Measurements were done at slice thickness of 160 microns (0.16 mm). The acquired volume was reconstructed into three-dimensional images with volume rendering software – CS 3D Imaging Software 3.1.9 (Carestream Health Inc.).

The following measurements were assessed according to a study conducted by Ikeda and Kawamura<sup>11</sup> (Figure 1)

- a. Anterior joint space (AS): Expressed by the shortest distance between the most anterior point of the condyle and the posterior wall of the articular tubercle
- b. Superior joint space (SS): Measured from the shortest distance between the most superior point of the condyle and the most superior point of the mandibular fossa
- c. Posterior joint space (PS): Represented by the shortest distance between the most posterior point of the condyle and

the posterior wall of the condylar fossa. Linear measurements of optimal joint space between the condyle and fossa were made on the sagittal section of the orthogonal slicing in the software module (Figure-2). Data gathered from the measurements were tabulated and organized to compare the Anterior, Superior and posterior joint spaces between the hyperdivergent and hypodivergent groups

**RESULT**

The images of the TMJ of the 30 subjects were taken using limited CBCT to evaluate the optimal condylar position. Anterior joint space, Superior joint space and Posterior joint space were measured, and the values were subjected to statistical analysis. A statistical report was created from linear measurements of joint space to compare both groups. A student's t- test was performed for comparison of joint space in hypodivergent (Group I ) and hyperdivergent (Group II) skeletal pattern.

Mean AS, SS, and PS of right and left side TMJ 's of hypodivergent (Group I) and hyperdivergent (Group II ) skeletal pattern were calculated and presented in Table 1. Paired t-test were used for each measurement to evaluate the average differences between the right and left side of group and between Group I and Group II. Statistical analysis with the t-test indicated no significant differences in right and left AS and PS values between the hypodivergent and and hyperdivergent groups. Statistically significant differences in right and left Superior joint space were found between the hypodivergent and hyperdivergent groups.

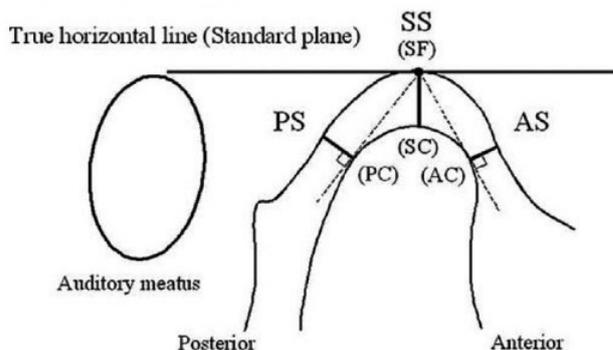
**DISCUSSION**

Knowledge on the spatial variations of normal condyle-glenoid fossa relationship could allow the clinician to potentially identify the beginning of a degenerative joint disease or indicate problems already established, as well as better treatment planning where obtaining values closer to normal is indicated.<sup>21,21</sup> Therefore, the accurate determination of these values in conjunction with clinical observations could be of great importance for diagnosis and treatment planning in different skeletal relationships.

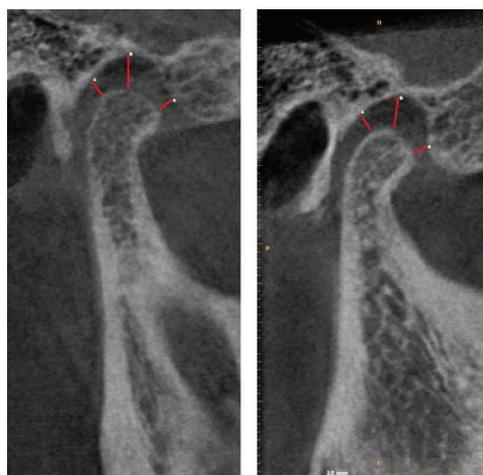
Proper diagnosis plays an important role in the successful treatment of temporomandibular dysfunction that includes internal derangement, osteo-arthritis, and myofacial syndromes. Dolwick defined internal derangement of TMJ as the abnormal relationship of the articular disc to the condyle, fossa and articular eminence with disc usually displaced in anteromedial direction.<sup>23,24</sup>

Temporomandibular joint is a unique joint. Moreover, TMJ is a rather difficult area for radiological investigation because there is no possibility for accurate evaluation of this position in conventional radiographs. Thus, more advanced techniques are needed to show anatomical relationships accurately.<sup>25</sup>

Ikeda and Kawamura<sup>11</sup> also stated that the accurate meas-



**Figure-1:** Measurements of Anterior, Superior and Posterior joint space



**Figure-2:** Limited cone beam computed tomography images of temporomandibular joint a. Anterior joint space (AS), b Superior joint space (SS), C Posterior joint space

		Group 1	Group2	SIG
AS	R	1.72 ± 0.3	1.64 ± 0.4	
	L	1.78 ± 0.5	1.70 ± 0.5	
PS	R	2.24 ± 0.4	2.14 ± 0.5	
	L	2.32 ± 0.3	2.26 ± 0.4	
SS	R	3.14 ± 0.5	2.42 ± 0.6	*
	L	3.18 ± 0.6	2.38 ± 0.7	*

**Table-1:** Values are presented as mean ± standard deviation. Group 1 Hypodivergent, Group 2 is hyperdivergent, R –Right, L- Left. \* p < 0.05

urement of condylar position can be done using CBCT and MRI. Soumalainen *et al.*<sup>26</sup> showed that the error of the linear measurement by using CBCT technique is less than multi-slice CT. Kobayashi *et al.*<sup>27</sup> found that the measurement error was significantly less with CBCT technique than the spiral CT. Moreover, CBCT allows accurate morphologic assessment of the bony structures of TMJ.<sup>11</sup>

The significantly smaller superior joint space in the hyperdivergent group indicates that the hyperdivergent skeletal pattern is associated with more superiorly positioned condyles. Similarly, Burke *et al.* found reduced superior joint space and posteriorly inclined condyles in preadolescent patients with skeletal Class II malocclusion and hyperdivergent tendency. They believe that this tendency reflects reduced condylar

tissue, predicts decreased condylar growth potential, and eventually results in increased anterior facial height during growth and development of the nasomaxillary and dentoalveolar complex.<sup>15</sup> They didn't find any correlation between facial morphology and antero posterior position of condyle in glenoid fossa. The absence of a significant difference in anterior and posterior joint spaces indicate a lack of correlation between vertical facial morphology and anteroposterior condylar position

Katsavrias *et al.*<sup>28</sup> reported that the class III group had closer vertical relationship between the condyle and the roof of the fossa, indicating that SS is smaller. His samples were mainly comprised of hyperdivergent pattern. In the present study also, we found that SS was smaller in hypodivergent skeletal pattern.

Gateo *et al.*<sup>29</sup> used linear measurements of both horizontal and vertical distances by using the geometric centers of the condylar head and the glenoid fossa and also anteroposterior joint space ratio for evaluation of the condylar position space ratio. They found that in the patient with anterior disc displacement posterior joint space and superior joint space was significantly less than normal group.

Ikeda and Kawamura<sup>11</sup> assessed the optimal position of the mandibular condyle in 24 joints of 22 symptom-free subjects (10 male, 12 female; mean age, 18 years) who had no disc displacement and verified it by MRI. He reported that optimal condylar position was 1.3 mm (SD  $\pm$  0.3 mm) for AS, 2.5 (SD  $\pm$  0.6 mm) for SS, and 2.1 (SD  $\pm$  0.3 mm) for PS.

Major *et al.*,<sup>30</sup> and Christiansen *et al.*<sup>31</sup> found an association between disc displacement and changes in joint space. Discrepancy between the optimal and the altered joint spaces might indirectly indicate disc displacement. Thus in all synovial joints, the articulating surfaces of the opposing bones should be held in firm contact by the associated ligaments and musculature and closely fitted between the opposing articular surfaces throughout the range of jaw movement. If this close relationship between the eminence and the condyle is lost due to disc displacement, there will be changes in joint space.

## CONCLUSION

It was hypothesized that hyperdivergent group would exhibit more superiorly positioned condyles than the hypodivergent group. The findings of this study demonstrated significantly lesser Superior joint space for hyperdivergent group as compared to hypodivergent group.

Therefore, if condylar position and joint spaces is not considered during assessment of orthodontic cases, the risk of misdiagnosis is high, being significantly higher in patients with the hyper divergent facial pattern.

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# An In-vitro Comparative Evaluation of Shear Bond Strength of Different Self-Etch Dentin Bonding Agents

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## ABSTRACT

**Introduction:** Adhesive procedures have evolved rapidly and have become routine in the daily practice of dentistry. Aim of the study was to examine the in vitro shear bond strengths to dentin of two one-step self-etch bonding systems and a two step self-etch bonding system.

**Materials and method:** The current study examined in vitro shear bond strengths to dentin of two one-step self-etch bonding systems and two step self-etch bonding system. 90 extracted non-carious permanent human premolars were used. The teeth were stored in 1% chloramine T solution at 4°C. The occlusal surfaces were trimmed with tungsten carbide bur and finished with 600-grit silicone-carbide discs. Three adhesive systems used: Clearfil SE bond (Kuraray) (two-step self-etch), Single Bond Universal (3M ESPE) (one-step self-etch) and Xeno V+ (Dentsply) (one-step self-etch). Filtek Z350 composite were bonded to the teeth. The specimens were stored at 37°C for 24 hours and were tested on the universal testing machine with a crosshead speed of 1 mm/min. Shear force required to debond the specimen was recorded.

**Results:** ANOVA test was used to compare statistical difference of shear bond strength between the groups (*P* value less than 0.05 was considered to be statistically significant). Multigroup comparison was done using Tukeys HSD test. There was a significant difference in the shear bond strengths among bonding systems. Clearfil SE reported a shear bond strength value of 36.6 MPa followed by single bond universal 27.29 MPa and Xeno V+ 25.1 MPa.

**Conclusion:** Clearfil SE delivered the highest shear bond strength value followed by single bond universal and Xeno V+. Two step self-etch recorded higher shear bond strength values to one-step.

**Keywords:** Dental bonding, Single step, Bond strength

## INTRODUCTION

Adhesive dentistry has revolutionized dentistry. The major determinant of successful esthetic dentistry remains the effective adhesion between the substitute and the restorative material.

Adhesive systems and bonding techniques have been constantly evolving since the introduction of Sevriton Cavity Seal, in the late 1940, by Oskar Hagger.<sup>1</sup> In 1955, Buonocore reported the use of 85% phosphoric acid to improve retention of an acrylic resin on enamel.<sup>2</sup> Bonding to enamel revolutionized the practice of restorative dentistry and has proven to be durable.

Dentin is a dynamic substrate and its morphology and physiology directly affect the ability of adhesive systems to produce durable bonds to its prepared surfaces. Dentin is a heterogeneous structure as it is a living tissue with fluid

filled channels that run from the pulp to the dentino-enamel junction (DEJ). While enamel is 96% hydroxyapatite (mineral) by weight while dentin is approximately 75% inorganic material (mineral), 20% organic material (mainly Type I collagen) and 5% water. It is subjected to continuous physiologic and pathologic changes affecting its microstructure, composition and permeability.<sup>3,4</sup> The number of tubules is 45,000/mm<sup>2</sup> at pulpal side; 35,000/mm<sup>2</sup> 1 mm from the pulp; 23,000/mm<sup>2</sup> 2mm from the pulp and 19,000/mm<sup>2</sup> subjacent to amelodentinal junction.<sup>5</sup> Therefore, bonding to dentin represents a challenging substrate for bonding.

Currently available resin-based adhesives may be divided into two major categories, self-etch and etch-and-rinse, based on the number of clinical steps required for each and their respective interactions with the tooth surface.<sup>6</sup>

Largely because of this continuing problem with total-etch adhesives, much of the current product development and clinician interest is focused on self-etching systems. The original self-etch systems included two steps—an acidic, self-etching primer followed by a separate bonding resin. Some of the newer systems are considered all-in-one, and contain etch, prime and bond functions in a single solution. The former group of materials can be described as self-etch primer systems, and the latter can be called self-etch adhesives.<sup>7</sup> Self-etch adhesive incorporates classic steps of etching, priming and bonding into one solution.

## MATERIALS AND METHOD

**Type of Study:** It is an in-vitro study with a sample size of 90 permanent human maxillary premolar.

### Materials used in the study (Fig. 1)

1. 1% Chloramine T
2. Cold cure acrylic resin
3. Xeno V+
4. Single bond universal
5. Clearfil SE Bond 2
6. Z 350 XT Composite resin system

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### Instruments used (Fig. 2)

1. Carbide bur( Prime and Dental, Mumbai)
2. Air rotor hand piece( N S K Corporation, Tochigi, Japan)
3. Plastic mould –
  - width 2.38 mm and height 3 mm
  - width 3 cm and height 4cm
4. 600-grit silicon carbide abrasive paper
5. Micro tip applicator brush( Shofu, Inc., USA)
6. Composite placing instrument ( HufriedyChicago, IL, USA)
7. Notched shearing blade
8. Mixing dish
9. Gloves

### Method of collection of data

**Inclusion Criteria:** Intact, freshly extracted teeth were included in the study (extracted for orthodontic reason) Teeth with similar morphology and relative coronal dimensions were included in the study

**Exclusion Criteria:** Teeth with caries, attrition, abrasion, restoration and surface cracks/defects. Any previous restorative or endodontic treatment. Fractured teeth, flourosed teeth, hypoplastic teeth

### Method

#### (a) Preparation of specimen

Teeth were thoroughly washed in running water and cleaned with an ultrasonic scaler unit (New Acteon Satelec P5 Booster Dental Piezo Ultrasonic Scaler). Until preparation for shear bond strength measurement, the teeth were stored in 1 % chloramine T (Central Drug House(CDH), New Delhi, India) bacteriostatic solution at 4° C until used. The occlusal surface of each tooth was trimmed with the help of tungsten carbide bur ( Prime and Dental, Mumbai) attached to the air rotor up at a depth of 2 mm from the cusp tip. The surfaces were then examined to ensure complete exposure of the dentin surface and finally the cut dentin surfaces were finished with 600-grit silicone-carbide discs (Model BP-2T Metal-lurgical specimen polisher, Banbros, Ghaziabad, India) to create a uniform smear layer under plenty of cool running to produce a uniform smear layer. Varnish was applied on the root portion of the teeth.

The root portion of the teeth was embedded in cold cure acrylic resin ( DPI-RR Cold Cure TM, DPI, India) using PVC mould (diameter:3 cm, height:4 cm) The specimens were randomly divided into three adhesive groups of thirty specimens each (total n=90):

- Group1: Clearfil SE bond(Kuraray)  
 Group 2: Single Bond Universal (3M ESPE)  
 Group 3: Xeno V+(Dentsply)

#### (b) Bonding procedures

These three commercial adhesive systems were used in this study and applied as recommended by the manufacturers. The composition and batch numbers of the materials used are listed in Table 1.

#### (c) Composite resin build-up

All bonding agents were used in combination with resin composite Filtex™Z350 XT (ESPE).

A transparent plastic mould was used to build the composite resin cylinder on the dentinal surface of all samples, measuring 2.38mm in internal diameter and 3 mm in height (Fig. 3). A marking of 1.5mm was made on the transparent tube so that equal increment of composite was placed. The resin composite (I) was condensed into the mould in two increments of 1.5mm each and light cured for 40 s at a light intensity of 600 MW/cm<sup>2</sup>. Adequate and consistent light intensity was assured by monitoring the curing light unit output using



Figure-1: Materials used in the study



Figure-2: Instruments used

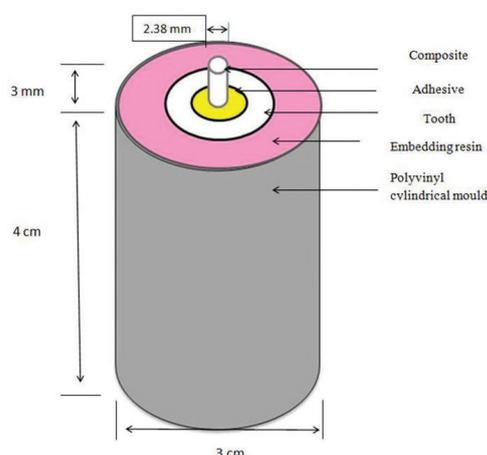
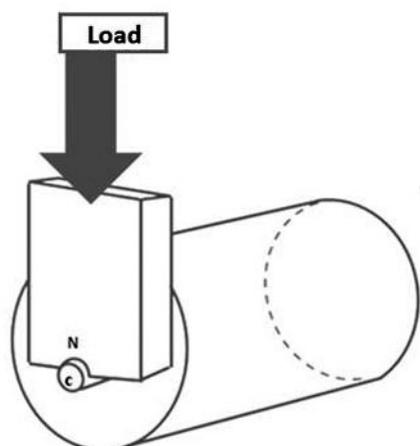


Figure-3: Schematic diagram of the bonded assembly

the unit's integrated light meter. After polymerization, all the specimens were transferred to distilled water, and stored at 37°C for 24 hours in incubator (Remi Instruments Ltd, Gurgaon, India).

#### (d) Shear bond strength testing

After storage, specimens were mounted on the universal testing machine (Banbros, Ghaziabad, India) force applied by the machine on each specimen was at a crosshead speed of 1 mm/min using a notch-edge blade parallel to the adhesive-dentin interface. The bonded composite cylinder was positioned horizontally, so that the shearing blade is perpendicular at composite-dentin interface. Each specimen was loaded until failure (Fig. 4). Debonding stress in megapascal was then



**Figure-4:** Schematic diagram of a shear test using a notched-edge

calculated by the ratio of maximum load in Newton to the surface area of prepared resin cylinder.

#### STATISTICAL ANALYSIS

In analysing the results of the variables under various methods considered in this research work, the statistical analysis like arithmetic mean, standard deviation and one way analysis of variance (abbreviated ANOVA) were used appropriately.

$$1. \text{ Shear bond strength (MPa)} = \frac{\text{Force (N)}}{\text{Cross sectional area (mm}^2\text{)}}$$

$$2. \text{ Arithmetic mean } x = \frac{1 \sum X}{n}$$

Where,

$\sum X$  is sum of all data values

$n$  is number of data items per sample

$$3. \text{ Standard Error} = \frac{SD}{\sqrt{n}}$$

$$4. \text{ Post hoc =HSD} = q \sqrt{MSE / n^*}$$

where  $q$  = the relevant critical value of the studentized range statistic

$n^*$  is the number of scores used in calculating the group means of interest.

Statistical analysis was performed using SPSS 17.0 (Chicago III) for analysis of data and Microsoft Word and Excel have been used to generate graphs, tables, etc. ANOVA test was used to compare statistical difference of shear bond strength between the groups ( $p$  value less than 0.05 was considered to be statistically significant). Multigroup comparison was done using Tukeys HSD test.

Adhesive	Composition	Manufacturer	Lot	Manufacturer's Application Protocol
Clearfil SE Bond	Primer: MDP, HEMA, hydrophilic aliphatic dimethacrylate, CQ, ethyl alcohol, water Bond: MDP, HEMA, Hydrophobic dimethacrylate, CQ, silanated colloidal silica pH=2.7	Kuraray Noritake Dental Inc., Japan	Primer (AD0112) Bond (AE0180)	Primer was applied to the entire tooth with a brush, left in place for 20 s and finally volatile ingredients were evaporated for 10 s. Bond was applied with a brush, dispersed with a very gentle stream of air and polymerised for 10s
Single Bond Universal	MDP phosphate monomer, dimethacrylates resins, HEMA, vitrebond copolymer, filler, ethanol, water, initiators, silane, pH ~ 2.7	3M ESPE, St. Paul, MN, USA	532119	Adhesive was applied to dentin with a brush and gently agitated for 20 s, then direct a gentle stream of air for 5 s until the adhesive no longer moves and polymerized for 10 s
Xeno V <sup>+</sup>	Bifunctional acrylamides, ethyl 2-(5-dihydrogen phospharyl-5,2-dioxapentyl) acrylate, acrylamide 2-methylpropanol-2 sulfonic acid, t-butanol, water pH ~ 1.3	Dentsply Detrey Konstanz, Germany	1311000781	Adhesive was applied to dentin and rub ifor 20 seconds, dried with a gentle stream of air for 5 seconds, and polymerized for 10 seconds.
Filtek™ Z350 XT Universal restorative	Bis-gma, UDMA and Bis-EMA. Additional contents: stabilizers, catalysts and pigments.	3M ESPE Dental Products, St. Paul, MN, USA	N 633113	Place Filtek Z 350 –shade A2. Light-cured each increment of 1.5mm for 40 s

**Table-1:** Materials used in the study with their compositions, manufacturers and application procedures

## RESULTS

The results can be summarized as follows (Table 2, Graph 1 and 2):

Group 1 demonstrated the highest shear bond strength value of 36.6 MPa while group 3 demonstrated least shear bond strength 25.1 MPa. Intergroup comparison done between the group 1 and group 2 showed statistically significant result ( $P < 0.05$ ). Intergroup comparison done between group 2 and 3 showed no statistically significant results ( $P > 0.05$ ). Intergroup comparison done between the group 1 and group 3 showed statistically significant result ( $P < 0.05$ ).

## DISCUSSION

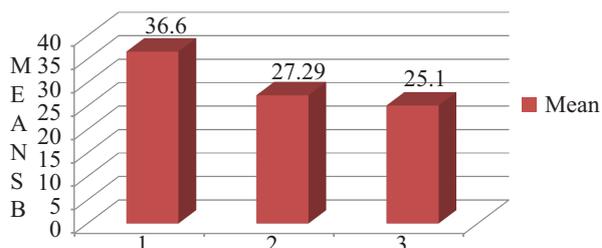
An accepted principle in restorative dentistry states that the transition between the restorative material and the dental hard tissue must be continuous to increase the survival probability of the restoration. Poor marginal adaptation may produce postoperative hypersensitivity, marginal discoloration, and ultimately secondary caries and pulpal inflammation.<sup>8</sup> The long-term clinical success of adhesive restoration is primarily dependent on the bonding quality of adhesive systems to dentin, and the key parameter for evaluating the bond quality of different dentin-adhesives systems is bond strength. An ideal bond strength test should be accurate, clinically reliable, and less technique sensitive. It should involve the use of relatively unsophisticated and inexpensive test protocols.<sup>9</sup> Oilo et al<sup>10</sup> classified them into qualitative screening tests and quantitative tests. Qualitative tests study bond failures, and quantitative tests predict the load capacity and lifetime of the bond. Bond strength can be assessed by laboratory methods and clinical performance. It can be measured statically using a macro- or micro-test set-up, basically depending upon the size of the bond area.<sup>9</sup>

International Standards Organization (ISO) Technical Specification No. 29022 provides guidance on substrate selection, storage, and handling. It also presents some specific test methods for bond strength measurements.<sup>11</sup>

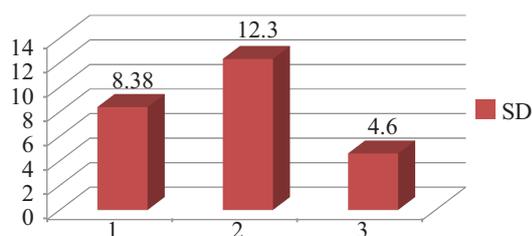
Testing with a bonded cross-sectional area of 3mm<sup>2</sup> or less is referred to as micro shear bond strength. Recently, the micro-shear bond strength ( $\mu$ -SBS) test has been advocated as a modified method for evaluating the bonding ability of dentin-adhesive systems. A significant advantage over micro-tensile strength methods is that  $\mu$ -SBS specimen is pre-stressed prior to testing only by removal.<sup>12</sup> Compared to the macro-shear bond strength test, the  $\mu$ -SBS test is more advantageous; it has fewer internal defects as well as more homogeneous stress distributions at the interface due to the use of smaller specimen.

Recently, Shimaoka et al.<sup>13</sup> proposed that the adhesive area should be delimited and constrained to the dentin substrate so as to equate the area between the adhesive and the resin and to eliminate differences in test results caused by traditional adhesive application technology.

Scherrer et al<sup>14</sup> carried out a meta-study on publications dating from 1998 to 2009 investigating the bond strength of resin composite to dentin using four protocols: shear, tensile,



**Graph-1:** Mean shear bond strength values of Group 1 (Clearfil SE), Group 2 (Single Bond Universal) and Group 3 (Xeno V+).



**Graph-2:** Standard deviation of Group 1 (Clearfil SE) Group 2 (Single Bond Universal) and Group 3 (Xeno V+).

Groups	Mean Difference	Std.error	P Value
Group 1 and Group 2	9.31	2.32	0.01
Group 1 and Group 3	11.5	2.32	0.01
Group 2 and 3	2.19	2.32	0.34

**Table-2:** Intergroup comparison of shear bond strength using post-hoc test, Where  $P < 0.05$  statistically significant and  $P > 0.05$  is non significant

microshear and microtensile bond strength. Six adhesives were selected covering three-step systems (OptiBond FL, Kerr-Sybron; Scotch Bond MP Plus, 3M ESPE), two-step systems (Prime and Bond NT, Dentsply; Single Bond, 3M ESPE; Clearfil SE Bond, Kuraray) and a one-step adhesive (Adper Prompt L Pop, 3M ESPE). The pooled results of 147 references showed high scattering in the bond strength data regardless of adhesive and test method.

Rüttermann et al<sup>15</sup> evaluated shear bond strength was different on human and bovine teeth. Since bovine enamel and dentin develop more rapidly during tooth formation, bovine enamel has larger crystal grains and more lattice defects than human enamel. This influence bond strength because different grain sizes and defective lattice structures will be differently attacked by chemicals. This might explain the different performance of self-etch and etch and rinse adhesives.

High shear bond strengths to occlusal dentin were observed than buccal dentin. Thus, substrate location has to be specified while studying bond strength as done in the current study where the occlusal dentin was used for shear bond test.<sup>16</sup>

Freshly extracted teeth are the most suitable substrate for *in vitro* evaluation of adhesive systems. Titley et al.<sup>17</sup> have reported that when teeth are stored by freezing to maintain their freshness, shear bond strength of resin to dentin is the highest. Distilled water, saline, 0.05% saturated solution of thymol, 0.5% chloramine-T, 2% glutaraldehyde, and 10% formalin solutions were studied as storage media for bond strength tests. According to the ISO technical specification

22902, bond strengths should be measured immediately post-extraction or within six months and chloramine T being ideal solution.<sup>11</sup>

Self-etching adhesives gave higher bond strengths when dentin surfaces were prepared with tungsten carbide burs and adhesives performed significantly better when a smaller grit size was used to prepare the dentin surface.<sup>18</sup> A meta-study carried out by Munck et al<sup>19</sup> revealed that the most-used preparation methods were by either a carbide or diamond dental bur or by silicon-carbide (SiC) paper. The diamond bur produced a thick smear layer and uneven dentin surface, while the tungsten carbide bur produced a thin, evenly distributed smear layer with a smoother dentin surface.

Hara et al<sup>20</sup> used a knife-edge steel rod to test specimens with 3-mm diameter bonding area and found statistically higher bond strengths for those loaded at 1.0 and 5.0mm/min compared to 0.5 and 0.75mm/min. Poitevin et al. recommended a crosshead speed of 1 mm/min for more uniform stress-time pattern.<sup>21</sup>

Feilzer et al<sup>22</sup> showed that polymerization stress in composite fillings is related to restoration configuration. The configuration factor C was defined as the ratio of the restoration's bonded to unbounded surfaces. In most bonding studies, the resin composite is bonded to the tooth at the bottom of the mould only, not to the sides. This results in a C-factor less than one and imparts little stress on the bond to the tooth as the resin polymerizes. If the resin composite can be bonded to the walls of the mould, as occurs in a tooth, this might provide a more clinically relevant test of bond strength.<sup>23</sup>

Clearfil SE was chosen specifically for this study as the comparison to the two universal agents based on the fact that it utilizes the same self-etching primer, MDP, and has also been shown in multiple studies to have consistently stronger bond strengths than other two-step self-etch bonding agents and similar to those of the three-step etch-and rinse with superior clinical longevity. As Inoue S et al<sup>24</sup> state, "long-term durability of adhesive-dentin bonds depends on the chemical bonding potential of the functional monomer," of which 10-MDP seems to be the most important due to its ability to strongly interact with hydroxyapatite and form a hydrolytically stable calcium salt.

In this in vitro study the two-step self-etch adhesives showed a superior in vitro performance in comparison to one-step self-etch adhesive. These results are in accordance with the other studies.

Serious limitation of all-in-one adhesives are as follows: incomplete polymerization and continued demineralization of the adjacent dentin structure in the tubules. For all-in-one adhesives to be acidic, the formulation have become more hydrophilic, thereby allowing deeper penetration. As these adhesives penetrate the wet dentinal tubules deeply, the water content increases. Studies have shown that this water acts as a major interfering factor in polymerization which leads to unpolymerized acidic and aggressive monomers to continue etching the dentin, thereby leading to a detrimental impact on the bond.<sup>25</sup>

Takahashi et al<sup>26</sup> the two-step self-etch adhesive systems

have been reported to yield higher bond strengths compared to one-step self-etch adhesive systems may be due to the proportions of their chemical constituents. Both contain functional monomers, crosslinking monomers, solvent, inhibitors and activators, but in different proportions. The one-step self-etch adhesive systems generally have less crosslinking monomers. These provide most of the mechanical strength, therefore, there is a potential for lower bond strength.

An estimated shear bond strength of 17-21 MPa has been proposed as the critical value needed to withstand these stress of polymerization contraction of composite material.<sup>27</sup> Clinical experiences confirm that this bond strength is sufficient for successful retention of resin restoration.

Bond strength to dentin depends on the material and the test method used. Additional clinical studies are needed to further evaluate the efficacy of all systems.

## CONCLUSION

Two-step Clearfil SE gave highest bond strength compared to all other groups. It can be concluded that the two-step self-etch adhesive bond recorded higher bond strength than the single-step self-etch adhesives.

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# Molar Incisor Hypomineralization: A Review

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## ABSTRACT

Molar incisor hypomineralization (MIH) is a common condition resulting in defect in permanent first molar and incisors. Etiological associations with systemic conditions or environmental insults during the child's first 3 years have been implicated. The high prevalence of molar incisor hypomineralization indicates the need for research to clarify etiological factors and improve the durability of restorations in affected teeth. The purpose of this paper is to review the diagnosis, prevalence, etiological factors, features and clinical management of molar incisor hypomineralization.

**Keywords:** Enamel Hypomineralization

## INTRODUCTION

"Molar Incisor Hypomineralization" is a condition in which permanent incisors and first molars shows demarcated enamel opacities ranging from white to brown.<sup>1</sup> This condition usually seen in permanent molars and incisors. In this condition enamel becomes soft, porous and sensitive. Sometimes it undergoes post-eruptive breakdown resulting in cavities. Patient's affected by molar incisor hypomineralization shows enamel loss and become susceptible to caries.<sup>2</sup>

## DEFINITION

Molar Incisor Hypomineralization is defined as the clinical appearance of morphological enamel defects involving the occlusal and/or incisal third of one or more permanent molars or incisors as result as "hypomineralisation of systemic origin." (Weerheijm et al. 2003)

## PREVALENCE

In many countries, researchers have established the prevalence of MIH in healthy children. The reported prevalence varies between 2.4% and 40.2%. Studies showed there is equal gender distribution.

The risk of involvement of the permanent maxillary incisors appears to increase when more PFMs are affected.<sup>3,17</sup>

## ENAMEL HYPOMINERALIZATION

Enamel is the hardest tissue in the human body, but its formation can be disturbed rather easily. Disturbances in enamel formation leave a permanent mark in the tooth. These disturbances can be inherited (e.g., amelogenesis imperfecta), acquired (e.g., induced by chemicals such as in fluorosis) or idiopathic (e.g., Molar Incisor Hypomineralization).

MIH are probably caused by a disturbance in the initial calcification and/or during the maturation phase of the enamel, causing demarcated opacities.<sup>4</sup> In MIH these opacities

contain more carbon and less calcium and phosphate.<sup>5</sup> The mineral content of the enamel is reflected in the mechanical properties of the enamel.<sup>6</sup> In MIH molars, the enamel density in the hypomineralised areas is lower than in sound areas.<sup>7</sup>

## DIAGNOSTIC CRITERIA

Modified DDE (developmental defects of enamel) index (FDI) 1992

- Mild- less than 30% of tooth enamel surface area visibly disrupted.
- Moderate- 31-49% of enamel surface area visibly disrupted.
- Severe – more than 50% of enamel surface area visibly disrupted.

Criteria for scoring molar incisor hypomineralisation (MIH) according to European Academy of Paediatric Dentistry (2003)

Code	Criteria
0	Enamel defect free
1	White / creamy demarcated opacities, no PEB
1a	White / creamy demarcated opacities, with PEB
2	Yellow/ brown demarcated opacities, no PEB
2a	Yellow/ brown demarcated opacities, with PEB
3	Atypical restoration
4	Missing because of MIH
5	Partially erupted (ie., less than one-third of crown height) with evidence of MIH
6	Un erupted/partially erupted with no evidence of MIH
7	Diffuse opacities (not MIH)
8	Hypoplasia (not MIH)
9	Combined lesion (diffuse opacities/hypoplasia with MIH)
10	Demarcated opacities in incisors only

In 2009 these criteria were updated to simplify the use of MIH score.

## MILD

*Opacity:* A defect that changes the translucency of the enamel, variable in degree. The defective enamel is of normal thickness with a smooth surface and can be white, yellow or brown in colour. The demarcated opacity is not caused by

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caries, ingestion of excess fluoride during tooth development or amelogenesis imperfecta, etc.

**MODERATE/SEVERE**

*Posteruptive enamel loss:* A defect that indicates surface enamel loss after the eruption of the tooth e.g. hypomineralization related attrition. Enamel loss due to erosion was excluded.

*Atypical caries:* The size and form of the caries lesion do not match the present caries distribution in the child’s mouth.

*Atypical restoration:* The size and form of the restoration do not match the present caries distribution in the child’s mouth.

*Atypical extraction:* The absence of a molar that does not fit with the dental development and caries pattern of the child.<sup>8</sup>

**HYPOMINERALIZED ENAMEL CHARACTERISTICS**

Molar incisor hypomineralization is a qualitative type of enamel defect that follows the natural incremental lines of enamel. In this type of enamel changes can be seen in hardness, porosity and mineral content of enamel.<sup>9</sup> (Farah et al., 2010) Some studies have shown this type of enamel defect increases the porosity and lowers the hardness.

**CLINICAL FEATURE**

Enamel is soft and porous. Demarcated opacities can be seen. Enamel colour change into white cream or yellowish brown.

- 1-4 First Permanent Molar’s may be affected.
- In severe cases, defective enamel is lost soon after eruption to expose underlying dentine.
- Increased risk of hypomineralised incisors where molars are more severely affected.
- Teeth affected from hypo-mineralization are hypersensitive.<sup>11</sup>

In this defect enamel shows opacities ranging from white to yellow brown. (Baroni and Marchionni, 2011). Yellow brown opacities occurs more frequent than the white patches. (Chawla et al., 2008)

**ETIOLOGY**

The causes of hypomineralised teeth are unclear although several factors that occur in the first four years after birth may be responsible. A recent study in Greece of 151 MIH children reported that 78% had experienced medical problems:

- (1) prenatally (19%)
  - (2) perinatally (44%)
  - (3) neonatally (22%).
- Only 15% of the children did not appear to have a putative etiological factor in their history.<sup>12</sup>

MIH may have a multifactor aetiology acting additionally or even synergistically (Alaluusua, 2010, Crombie et al., 2009, Fagrell et al., 2011), with a genetic predisposition associated with one or more of a range of systemic insults occurring at a susceptible stage in the development of specific teeth. These

factors may be environmental like antibiotics, vaccines, socioeconomic factors, nutrition etc. medical like chickenpox, infectious disease, respiratory disease, vitamin D deficiency, genetic factors like DLx gene, Enamelysin protein. Systemic factors like severe malnutrition, bilirubinemia, thyroid and parathyroid disturbances, maternal diabetes.<sup>13-16</sup>

**TREATMENT MODALITIES**

A 6-step management approach is proposed to treat the molar incisor hypomineralization. William et al. [2006]

Steps	Recommended procedures
Risk identification	Assess medical history for putative etiological factors
Early diagnosis	Examine at-risk molars on radiographs if available
	Monitor these teeth during eruption
Remineralization and desensitization	Apply localized topical fluoride
Prevention of dental caries and post-eruption breakdown (PEB)	Institute thorough oral hygiene home care program
	Reduce cariogenicity and erosivity of diet
	Place pit and fissure sealants
Restorations or extractions	Place intracoronal (resin composite) bonded with a self-etching primer adhesive or extracoronal restorations (stainless steel crowns)
	Consider orthodontic outcomes post-extraction
Maintenance	Maintenance
	Consider full coronal coverage restorations in the long term

Mathu-Muju and Wright [2006] who proposed a treatment approach according to the level of defect severity (mild, moderate, severe) and to the length of treatment time needed (short and long term).

**PREVENTIVE APPROACH**

In children’s with this type of defect parents should encouraged to use their children’s flouride toothpaste. Willmott et al, 2008. Another product that might be also useful for MIH patients and requires further research [William et al., 2006a; Willmott et al., 2008] is Casein (Phosphopeptide-Amorphous Calcium Phosphate, CPP-ACP). This product has been shown to create and stabilise a super saturated solution of calcium and phosphate followed by deposition at the enamel surface. CPP-ACP has been incorporated into sugar-free chewing gum and encourages remineralisation of the sub-surface carious lesions [Shen et al., 2001]. The use of 0.4% stannous fluoride gels on a daily basis have also been proposed to be helpful for reducing sensitivity in defective teeth [Fayle, 2003].

Fissure sealants (FS) may also be useful for FPM with mild defects, not sensitive and without breakdown, particularly when they are regularly monitored and replaced when lost [Fayle, 2003; Mathu-Muju and Wright 2006; William et al., 2006a].

## RESTORATIVE APPROACH

Defective enamel should be removed and should be restored with GIC, Resin Modified Glass Ionomer Cements (RMGIC), Polyacid modified composite resins (PMCR), and Composite resins (CR), [William et al., 2006, 2008]. GIC has been additionally proposed as an intermediate layer restoring the dentinal contours, prior to composite placement, in cases that the cavity involves large areas of dentine [Mathu- Maju and Wright, 2006]. The only material that appears to be usable for one or more surfaces restorations in MIH molars is Composite Resin. There are clinical studies dealing with the outcome of such restorations in MIH molars. Lygidakis et al. [2003] evaluating the success rate of CR restorations placed on two or more surfaces including cusps of affected molars, reported good acceptable results after 4 years.

## RESTORING HYPOMINERALISED PERMANENT MOLARS WITH FULL CORONAL COVERAGE

Preformed metal crowns (PMC) for use on FPM have been used for many years to cover molars with defective enamel and they are still recommended as a treatment option for MIH posterior teeth [Fayle, 2003; William et al., 2006a; AAPD, 2008]. They prevent further tooth loss, control sensitivity, establish correct interproximal and proper occlusal contacts, are not costly and require little time to prepare and insert. Kotsanos et al. [2005] reported that no replacement was needed for PMC placed on 24 molars with MIH, for a period of 3-5 years. Zagdwon et al. [2003] reported good success rate with only one failure of 19 PMC placed over a 2 year-period, they also found that there were no significant differences between the longevity and success rates for PMC and cast adhesive copings (nickel chrome alloy). Acceptable results were reported for laboratory-fabricated crowns on defective molars, either gold in 29 teeth or tooth-coloured in 12 teeth [Koch and Garcia-Godoy, 2000].

## RESTORING HYPOMINERALISED PERMANENT INCISORS

Microabrasion using abrasive paste and 18% hydrochloric acid might be effective only in shallow patchy whitish defects [Fayle, 2003; William et al., 2006a; Mathu-Muju and Wright, 2006; Joiner, 2006].

Restorations with CR and veneers are an alternative choice for anterior MIH defective teeth in children and adolescents with larger enamel defects that require treatment [Wray and Welbury, 2001]. Veneers using CR in long term may suffer from susceptibility to discolouration, wear and marginal fractures, reducing thereby the aesthetic long-term result [Peumans et al., 1997]. In such cases and in older children and adolescents porcelain veneers are indicated [Wray and Welbury 2001; AAPD, 2008] The etch-bleach-seal technique [Wright, 2002] should be clinically evaluated further in large samples of MIH incisors, as it appears promising for interceptive early approach in aesthetic problems. Chair-side

bleaching with 10% carbamide peroxide, for brownish-yellow defects should be investigated but only in older children. Note should be taken of the side effects of sensitivity, mucosal irritation and enamel surface alterations [Wray and Welbury, 2001; Dahl and Pallesen, 2003; Joiner, 2006].

## EXTRACTION AND ORTHODONTICS

Study by Jälevik and Møller [2007] stated that the extraction of severely affected FPM in MIH patients was an adequate treatment alternative to restorative care. They examined the orthodontic status of 20 patients 3.8-8.3 years after extractions and concluded that 15 of them had an acceptable occlusion. Space reduction and favourable development could be expected if the extractions were undertaken prior to the eruption of the permanent second molar teeth.

## CONCLUSION

Although the etiology is multifactorial early identification of children with this type of defect is important so that preventive and restorative measures can be applied as soon as possible to avoid the complications

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# Vitamin D and Calcium v/s Bisphosphonates in the Secondary Prevention of Osteoporosis and Prevention of Osteoporotic Fractures Following a Low Energy Fracture

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## ABSTRACT

**Introduction:** Bones commonly involved in osteoporosis are the vertebra, forearm bones, and hip. Calcium, vitamin D and Bisphosphonates are used in the treatment of osteoporosis and prevention of a second fracture. Objective of the study was to study the effectiveness of bisphosphonates and Vitamin D and Calcium in osteoporosis and prevention of a second osteoporotic fracture.

**Materials and Methods:** Patients with osteoporotic/fragility fractures were included in the study. DEXA scan was performed at one month after discharge. Patients were divided into 3 groups, receiving Zoledronic acid, Calcium and Vitamin D, and no anti-osteoporotic prophylaxis. DEXA scan was repeated at 2 years and the three groups were compared. Patients were followed for a total of 5 years for the development of a second fragility fracture.

**Results:** Most of the patients with low energy fractures had osteoporosis. Patients receiving Zoledronic acid had a substantial increase in Bone Mineral Density as compared to those who received Vitamin D and calcium, or no prophylaxis. A total of 1 (2.6%) new low energy fracture (vertebral) occurred in patients receiving Zoledronic acid, 5 (13.5%) new low energy fractures (4 vertebral, 1 hip) occurred in patients receiving vitamin D and calcium and 7 (18.4%) new low energy fractures (5 vertebral, 1 hip, 1 wrist) occurred in patients receiving no prophylaxis.

**Conclusion:** Bisphosphonates are much better than vitamin D and calcium supplementation in increasing overall bone mineral density and preventing second fragility fracture in patients with osteoporosis.

**Keywords:** Calcium, Vitamin D, Bisphosphonates, Osteoporotic Fractures, Osteoporosis

## INTRODUCTION

Osteoporosis is a systemic disease of the old age. It means increased demineralisation of the skeleton leading to decreased bone strength and an increased risk of fractures. It is the most common reason for a broken bone among elderly population. Osteoporosis may be primary (Age related loss of minerals from the skeleton), or secondary to endocrine, haematological, genetic, environmental or other factors. Primary osteoporosis is further classified into type 1 or post-menopausal and type 2 or senile osteoporosis.

Dual-energy X-ray absorptiometry (DEXA) is the most common method used to study Bone Mineral Density (BMD) or bone mass. It is used to identify people with osteopenia or osteoporosis. Since 1994, WHO has established the standard of diagnosis of diagnosing osteoporosis as a bone mass den-

sity of 2.5 standard deviations below that of a young adult, while it defines osteopenia is defined as a bone density of 1 standard deviations below that of a young adult of same gender.<sup>1</sup> Measurements of bone mineral density can predict fracture risk, lower bone BMD higher are the chances of fracture even with minor traumas.<sup>2</sup>

Osteoporosis is often asymptomatic, but is just as dangerous and serious as hypertension, diabetes or dyslipidaemia. In USA in 2010, in 100 million population above 50 years of age, an estimated 10 million suffered from osteoporosis, while an additional 40 million suffered from osteopenia.<sup>3</sup>

Women are more commonly affected than men. This is because of the small bones in women, malnourishment in women that is common in developing countries as well as the deficiency of bone protective Estrogen in Post-menopausal women. Type 1 or postmenopausal osteoporosis occurs in 5% to 20% of women. The frequency of postmenopausal osteoporosis accounts for the overall female-male ratio of 2:1 to 3:1.<sup>4</sup>

The lifetime risk of suffering an osteoporotic fragility fracture for adult women is 1 in 3. For males, the risk is less, but remains substantial at 1 in 12.<sup>5</sup> Following a fragility fracture, the risk of sustaining a subsequent fracture at least doubles, with a 30-40% increase during the three years following the fracture. A 10% loss of bone mass in the vertebrae can double the risk of vertebral fractures, and similarly, a 10% loss of bone mass in the hip can result in a 2.5 times greater risk of hip fracture.<sup>6</sup>

Osteoporotic patients usually sustain fractures following low energy traumas like fall. Bones that commonly break include the vertebra, forearm bones, and the hip.<sup>7,8</sup>

The prevention of osteoporotic fractures includes fall prevention, calcium and Vitamin D supplementation and lifestyle advice like exercising<sup>9</sup>, stopping smoking and drinking etc,<sup>10</sup> as well as pharmacological therapy. Pharmacological treatment can be broadly divided according to their mode of action. These include anti-resorptive agents like the bi-

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sphosphonates (alendronate, risedronate, ibandronate and zoledronic acid), the Selective Estrogen Receptor Modulators (SERMs), antibodies like denosumab and bone forming agents like parathyroid hormone and teriparatide. Drugs like strontium ranelate appears to have both antiresorptive and anabolic activities.<sup>11</sup>

Calcium is an essential element in the human body. Calcium is not only important to bone health, but it is also essential for homeostatic functions. It is a vital component of bones. The primary functions of vitamin D are increasing intestinal calcium absorption, decreasing renal excretion and the stimulation of bone mineralisation. It is estimated that 90% of adults above 50 years of age do not get enough vitamin D from their diet.<sup>12</sup>

Calcium (1000 mg/day) and vitamin D (800 units/day) supplementations have been shown to reduce the incidence of osteoporotic fractures.<sup>13,14</sup>

Bisphosphonates are a class of drugs that prevent the loss of bone mass. They are the most common drugs used to treat osteoporosis.<sup>15</sup> Bisphosphonates inhibit the digestion of bone by encouraging osteoclasts to undergo apoptosis.<sup>16</sup> For zoledronic acid, an early effect (fractures reduced within 6–12 months of starting therapy) has been shown. A sustained effect has been shown through 5 years.<sup>17</sup> Administration of bisphosphonates results in changes in biochemical markers of bone turnover and in bone mineral density. Zoledronic acid increases spinal bone mineral density at 12 months to 5 percent above values found in patients receiving placebo.<sup>18</sup> Bisphosphonates have been shown to increase BMD and reduce fracture risk by between 30 and 60%.<sup>6,19</sup> We started this study to compare the usefulness of Calcium and vitamin D supplementation and the use of bisphosphonates in patients with an osteoporotic fragility fracture, in the prevention of second osteoporotic fracture and in secondary prevention of osteoporosis.

## MATERIALS AND METHODS

A total of 113 patients aged over 50 years with a low energy fracture of Spine, Hip or Distal radius were included in the study.

Informed consent was obtained from each patient included in the study and The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki as reflected in a prior approval by the institution's human research committee.

### Inclusion criteria

1. Age > 50 years
2. Any sex
3. Low energy trauma. (fall from standing height, sitting, no history of trauma, etc. were considered as low energy trauma, while road traffic accidents, fall from height etc. were considered high energy trauma)
4. Vertebral compression fracture, Hip fracture (intertrochanteric or neck of femur fracture) or Distal radius fracture.
5. 1st fragility fracture.

### Exclusion criteria

1. Age < 50 years
2. High energy trauma
3. 2nd or more episode of fragility fracture.
4. Secondary causes of osteoporosis or fracture and/or significant medical history.

This was a randomised study. DEXA scan was performed at one month after discharge. After this, patients were matched for fracture type, BMD groups and sex and patients from each matched cluster were divided into 3 groups by toss of dice.

First group (38 patients) received annual Zoledronic acid 5 mg iv infusion, Second group (37 patients) received daily Calcium (1000mg) and Vitamin D (600 IU) supplements via oral route, And third group (38 patients) received no anti-osteoporotic prophylaxis. However they received diet modification, lifestyle modifications and anti-fall measures and so did the other two groups. The osteoporotic patients were given different treatments as the main objective of the study was finding the relation of these treatment modalities in prevention of second fracture in patients who had one fracture already. Although bisphosphonates are proven to increase bone mass, but whether this increase is translated into real life benefit like decrease in future fractures isn't well established in literature.

DEXA scan was repeated at 2 years and the three groups were compared with the first DEXA Scan and with each other. Patients were followed for a total of 5 years for the development of a second wrist, hip or spine fracture and this data was compared in the three groups.

## RESULTS

A total of 113 patients aged over 50 years with a low energy fracture of Spine, Hip or Distal Radius were included in the study. 65 patients (57.5%) had vertebral compression fracture, 26 patients (23%) had hip fractures while 22 (19.5%) had distal radius fracture. Out of the 65 vertebral fractures 16 occurred in men and 49 (75%) occurred in women. Out of the 26 hip fractures 10 occurred in men while 16 (62%) occurred in women, and out of the 22 distal radius fractures 6 occurred in men while 16 (72%) occurred in women.

In total 32 fractures (28.3%) occurred in men while 81 fractures (71.7%) occurred in women. DEXA scan was performed at one month after discharge and found that; Out of 65 patients with vertebral fractures 52 (80%) had osteoporosis, 9 (14%) had osteopenia, while 4 (6%) had normal bone mineral density (BMD). Out of 26 patients with hip fractures 16 (61.5%) had osteoporosis, 4 (15.5%) had osteopenia, while 6 (23%) had normal bone mineral density, Out of 22 patients with Distal radius fractures 9 (41%) had osteoporosis, 5 (23%) had Osteopenia, while 8 (36%) had normal bone mineral density. In total 77 patients (68%) had osteoporosis, 18 (16%) had osteopenia, while 18 (16%) had normal BMD. Patients were matched for fracture type and sex and were divided into 3 groups. First group (38 patients) received annual Zoledronic acid infusion, Second group (37 patients) received daily Calcium and Vitamin D supplements, And

third group (38 patients) received no anti-osteoporotic pharmacological prophylaxis.

We repeated DEXA scan at 2 years and found that patients receiving Zoledronic acid had a 5.1% increase in BMD at spine as compared to patients receiving Vitamin D and Calcium who had a 0.8% increase in BMD as compared to patients receiving no prophylaxis who had a 0.2% increase in BMD. Patients receiving Zoledronic acid had a 3.2% increase in BMD at Hip as compared to patients receiving Vitamin D and Calcium who had a 0.4% increase in BMD as compared to patients receiving no prophylaxis who had a 0.3% Decrease in BMD. Patients receiving Zoledronic acid had a 1.8% increase in BMD at Distal radius as compared to patients receiving Vitamin D and Calcium who had a 0.6% increase in BMD as compared to patients receiving no prophylaxis who had a 0.3% increase in BMD.

Patients were followed for 5 years for the development of a second fracture. 1 new vertebral fracture occurred in the group receiving zoledronic acid (2.6% incidence), 4 new vertebral fractures occurred in the group receiving Vitamin D and calcium (10.8% incidence) and 5 new vertebral fractures occurred in the group receiving no prophylaxis (13% incidence).

No new hip fracture occurred in the group receiving zoledronic acid (0% incidence), 1 new Hip fracture occurred in the group receiving Vitamin D and calcium (2.7% incidence) and 1 New hip fracture occurred in the group receiving no prophylaxis (2.7% incidence). No new wrist fracture occurred in the group receiving zoledronic acid (0% incidence), no New wrist fracture occurred in the group receiving Vitamin D and calcium (0% incidence) and 1 new wrist fracture occurred in the group receiving no prophylaxis (2.7% incidence). A total of 1 (2.6%) new low energy fracture occurred in patients receiving zoledronic acid, 5 (13.5%) new low energy fractures occurred in patients receiving Vitamin D and calcium and 7 (18.4%) new low energy fractures occurred in patients receiving no prophylaxis.

## DISCUSSION

Osteoporotic/fragility fractures are the most common fractures in elderly population. In our study 57.5% had vertebral compression fracture, 23% had hip fractures while 19.5% had distal radius fracture. Similar statistics are also seen in other countries like the Unites States having 47% vertebral fractures, 17% hip fractures and 17% distal radius fractures.<sup>20</sup> Various authors have recommended screening in women older than 65 years, in post-menopausal women, in people with risk factors for osteoporosis or patients with secondary causes that may lead to osteoporosis but there is no specific guideline for screening for osteoporosis, and the risk to benefit ratio of screening for osteoporosis is still being evaluated.<sup>21,22</sup>

Osteoporosis is often asymptomatic, but is just as dangerous and serious as hypertension, diabetes or dyslipidaemia. The lifetime risk of suffering an osteoporotic fragility fracture for adult women is 1 in 3. Following a low energy osteoporotic fracture, the risk of sustaining a second osteoporotic fracture

at least doubles, with 30–40% increase in fractures in the first 3 years following the fracture.<sup>6</sup> Unfortunately in both developed as well as developing countries orthopedicians and doctors in general aren't approaching osteoporosis with the seriousness that it deserves.

There is no screening protocol for vitamin D levels and osteoporosis in general population, high risk population or even those with fractures suggestive of osteoporosis. Orthopedicians and family physicians are more interested in fixing the fractures with very little attention paid to treating the underlying cause. Patients with osteoporotic fractures are rarely advised DEXA, vitamin D and Calcium supplements are prescribed for very brief durations; Bisphosphonates are used in occasional patients, there is no concept of lifestyle modification for treatment of osteoporosis and the follow-up of osteoporosis is much less than adequate. Various studies like NICE have highlighted the inadequate bone health services even in the developed countries and have advocated secondary prevention of osteoporotic fractures and have promoted the pharmacological management of osteoporosis.<sup>23</sup>

In our study most of the low energy fractures occurred in women accounting for 71.7% of fractures. 68% of the patients with low energy fractures had osteoporosis, 16% had osteopenia, while 16% had normal BMD. In our study we found that vertebral compression fracture were the most common fragility fractures followed by hip and distal radius fracture. Patients receiving Zoledronic acid for 2 years had a substantial increase in BMD at spine, hip and distal radius as compared to those who received Vitamin D and calcium, and patients who received vitamin D and Calcium for 2 years had more increase in BMD than those who received no anti-osteoporotic prophylaxis but this difference wasn't that substantial. Similar results have also been seen in previous studies, indicating that administration of bisphosphonates increases bone mass as compared to a placebo.<sup>24</sup> Patients were followed for 5 years for the development of a second fracture. A total of 1 (2.6%) new low energy fracture (vertebral) occurred in patients receiving zoledronic acid, 5 (13.5%) new low energy fractures (4 vertebral, 1 hip) occurred in patients receiving Vitamin D and calcium and 7 (18.4%) new low energy fractures (5 vertebral, 1 hip, 1 wrist) occurred in patients receiving no prophylaxis.

Previous studies have also found that bisphosphonates are associated with decrease in risk of osteoporotic fractures.<sup>24-26</sup> We conclude that bisphosphonates are much better than Vitamin D and calcium supplementation in increasing overall bone mineral density in patients with osteoporosis.

Vitamin D and calcium supplementation seem to increase bone mineral density and prevent second fractures as compared to no prophylaxis but this difference isn't as large as that between bisphosphonates and no prophylaxis.

Over the past decades, the seriousness of osteoporosis is slowly being recognised all over the world. Various organisations like the British orthopaedic association recommend that orthopaedic surgeons should not only treat the fractures but should also treat the cause of the fracture, and should also initiate appropriate assessment and treatment for the

prevention of further fractures.<sup>5</sup> There is a great need to educate the general population and health care providers about osteoporosis.

We recommend the use of bisphosphonates as well as calcium and vitamin D supplementation in patients with known osteoporosis or a fracture suggestive of osteoporosis. In our institute we treat all low energy fractures of hip, spine or wrist as osteoporosis. Vitamin D and calcium are started immediately on discharge on a once daily oral dosage. Bisphosphonates are started after a month of fracture treatment. In our institute we prefer the use of zoledronic acid over other bisphosphonates. We have found it to be safe and easy to administer. Patients are more comfortable with annual administration of this drug rather than daily or monthly use of other bisphosphonates. Patient compliance is high with this drug and the overall results are also good.

We also discuss and encourage DEXA test to female patients attending our clinic who are above 60 years and to male patients who are above 70 years of age. However this test is purely voluntary. If this test is done, we put the patients with osteopenia on Vitamin D and Calcium supplementation and encourage them to take healthy diet and exercise regularly and to stop smoking. In patients with osteoporosis, we also start annual Zoledronic acid.

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# Effect of Thiopentone and Propofol on Intraocular Pressure

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## ABSTRACT

**Introduction:** The impact of anaesthetic drugs on intra-ocular pressure needs to be known when ophthalmic surgery is to be carried out, especially on patients with high intra-ocular pressure. This study was designed to evaluate and compare the intraocular pressure response by injecting thiopentone 2.5% Vs propofol 1% as induction agents in patients under going cataract surgery.

**Materials and methods:** Forty patients who were planned for cataract surgery were divided into two group. One group was given thiopentone and other propofol. Intra-ocular pressure was monitored

**Results:** The mean intra-ocular pressure in thiopentone group was 13.38 and 13.31 at 3 and 6 minutes. The mean intra-ocular pressure of propofol group was 11.46 and 11.45 at 3 and 6 minutes. Propofol treated group exhibited significant reduction in intra-ocular pressure compared to thiopentone group

**Conclusion:** Usage of propofol will be beneficial to patients who undergo cataract surgery with elevated intraocular pressure.

**Keywords:** Thiopentone and Propofol

## INTRODUCTION

Regulation of intraocular pressure and management of its consequences pose a unique challenge to the anesthesiologist during eye surgery. General anesthesia has been in use for ophthalmic surgery since 1847. The normal intra-ocular pressure varies from 10-20mmHg. Higher intra-ocular pressure is associated with risk of expulsion of intra-ocular contents on opening the eye.<sup>1</sup> The usual effect during maintenance of general anesthesia is to produce a fall in the intraocular pressure.<sup>2</sup> Local anaesthesia was first introduced in the year 1884 by Carl Koller.<sup>3</sup> Though local anesthesia for ophthalmic surgery has been accepted as a routine for more than a century,<sup>4</sup> precise control of intra-ocular pressure is an accepted advantage of general anesthesia. The impact of anaesthetic drugs on intra-ocular pressure needs to be known when ophthalmic surgery is to be carried out, especially on patients with high intra-ocular pressure. With the above in mind this study was designed to evaluate and compare the intraocular pressure response by injecting thiopentone 2.5% Vs propofol 1% as induction agents in patients undergoing cataract surgery.

## MATERIALS AND METHODS

After getting institutional ethical clearance forty patients with informed consent were included in the study. Healthy patients of either sex and aged between 50-65 years undergoing cataract surgery at Saveetha Medical College, were included for this study. Inclusion criteria are patient un-

dergoing cataract surgery. Exclusion criteria are associated systemic diseases, glaucoma and patients on drugs which reduce intra-ocular pressure. All the patients were premeditated with Injection Diazepam 0.2mg/kg, 45 minutes before surgery. Intraocular pressure in normal eye was measured for all the patients using schiotz tonometer. Intra-ocular pressure was measured in supine position only. Patients were randomly divided into two groups of twenty each. Group I received injection Thiopentone 2.5% at 5 mg/kg body weight intravenously and Group II received injection Propofol 1% at 2mg/kg body weight intravenously for sedation before administering local anaesthetic for cataract surgery. After injection, intraocular pressure was measured at 3 minutes and 6 minutes in non-surgery eye in both the groups. Three values of intra-ocular pressure were recorded. Two way ANOVA analysis of variance was done to measure the difference from baseline value in each group and between groups. Bonferroni multiple comparison method used to compare P-value.

## RESULTS

The mean intra-ocular pressure in group I was found to be 16.55 and in group II it was 16.37, before administration of thiopentone or propofol respectively. Table 1 shows the observations recorded in both the groups at 3 minutes and 6 minutes after administration of drug. The mean intra-ocular pressure in group I was 13.38 and 13.31 at 3 and 6 minutes. The mean intra-ocular pressure of group II was 11.46 and 11.45 at 3 and 6 minutes. The P-value for intra-ocular pressure reduction within group and between group was <0.001 (highly significant). Hence within group, significant reduction in intra-ocular pressure was observed between 0 and 3 minute observation in both groups. Significant variations in intra-ocular pressure measurement were observed

Time	Group I (thiopentone)		Group II (Propofol)	
	Mean	SD	Mean	SD
0 minutes	16.55	0.59	16.37	0.47
3 minutes	13.38	0.5	11.46	0.46
6 minutes	13.31	0.52	11.45	0.41

**Table-1:** Comparison of intra-ocular pressure before and after administering thiopentone and propofol

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source	'F' value	'P' value	Bonferroni multiple comparison test results
Intra-ocular pressure	1480.61	<0.001	0 min Vs 3, 6min
Intra-ocular pressure and drugs	65.41	<0.001	

**Table-2:** Two way ANOVA test

between groups at 3 minute, and 6 minutes. Propofol treated group exhibited significant reduction in intra-ocular pressure compared to thiopentone group. (Group I). Two way ANOVA analysis of variance (Table 2) reveal significant difference in reduction of intraocular pressure within group and between groups. Bonferroni multiple comparisons showed that significant reduction of intra-ocular pressure occurs at 3min and 6min. However there was no difference between 3min and 6 min recording.

## DISCUSSION

Intra-ocular pressure is a measurement of the fluid pressure inside the eye. Normal eye pressure usually ranges from 10 to 21 mm Hg with an average of 16 mm Hg. Pressure that is consistently above 21 mm Hg indicates ocular hypertension. If the intra-ocular pressure is elevated, it can cause pressure within the eye to increase and damage the optic nerve. Temporary variation in pressure is usually well tolerated in the normal eyes. However, transient episodes of increased intraocular pressure in patients with low ophthalmic artery pressure may jeopardize retinal perfusion and cause retinal ischemia.

The results in our study clearly show that propofol reduces intraocular pressure significantly more than thiopentone. This is in agreement with the study made by Guedes (1988).<sup>5</sup> He observed significant decrease in intra-ocular pressure in patients treated with propofol compared to those who received thiopentone. Neel (1995) also observed significant reduction in intra-ocular pressure after administering propofol even in smaller dose.<sup>6</sup> He also observed significant reduction of intra-ocular pressure up to 7 minutes. Our study also showed a significant reduction upto 6 minutes. Mirakur (1988) used thiopentone and propofol with vecuronium of 0.15 mg / kg for neuromuscular block.<sup>7</sup> He too observed significant reduction in intra-ocular pressure in patients treated with propofol. Mirakur(1987) recorded that propofol controls the raise in intra-ocular pressure caused by giving succinylcholine and tracheal intubation.<sup>8</sup> The study done by Zimmerman showed that combination of propofol and alfentanil prevents the increase of intra-ocular pressure associated with succinyl choline and endotracheal intubation.<sup>9</sup> In Study done by Katzenschlager in 2002 there was equal reduction of intra-ocular pressure by both sevoflurane and propofol.<sup>2</sup> Laryngoscopy cause significant increase in intra-ocular pressure.<sup>10</sup> Hence just sedation with propofol would be a better alternative to general anaesthesia.

## CONCLUSION

Comparative performance of thiopentone and propofol as inducing agents on intraocular pressure during ophthalmic surgery was investigated. It was observed that propofol reduces intraocular pressure significantly more than thiopentone. Usage of propofol will be beneficial to patients who undergo cataract surgery with elevated intraocular pressure.

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# Analysis of Clinical Profile of Childhood Bronchial Asthma in the Asthma Clinic of a Tertiary Care Medical College Hospital

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## ABSTRACT

**Introduction:** Asthma is a chronic inflammatory disease of airways that is characterised by increased responsiveness of the tracheobronchial tree to a multiplicity of stimuli. Prevention plays a pivotal role in reducing its morbidity and mortality. This study was conducted to understand the various risk factors and its spectrum in children with asthma.

**Materials and methods:** A prospective analysis of children attending the Asthma clinic of a tertiary care medical college hospital. A detailed history was taken using the proforma having special reference to age, sex, age of onset, symptomatology and triggering factors.

**Results:** Among the 100 children with asthma in the study 4% were less than 1 year of age and 32% in 4-6 years. 35% were female children. Parental asthma was seen in 70% of the children. 69% had severe lower respiratory tract infection below 2 years. Among the total cases, 36% had environmental tobacco exposure and 11% were low birth weight. The triggers found were infection (54%), allergy (47%), exercise-induced asthma (34%) and 9% had both infection and allergy. The mild intermittent, mild persistent and moderate persistent asthma were 22, 17 and 61%, respectively. None of them had severe persistent asthma. 42% were on inhaled steroids. Regular follow up was seen in 56% of patients with 26% having good compliance.

**Conclusion:** A good compliance with knowledge of asthma, regularly visiting asthma clinic, control of environmental triggers and co-morbid conditions, seeking early medical care and early treatment can reduce morbidity and mortality up to significant level.

**Key words:** Asthma, Lower respiratory tract infection, Allergy, Atopy, Steroids, Tracheobronchial

## INTRODUCTION

Asthma is a chronic inflammatory disease of airways that is characterised by increased responsiveness of the tracheobronchial tree to a multiplicity of stimuli. Childhood bronchial asthma (CBA) is the most common chronic disease in the industrialized nations and its prevalence is increasing throughout the world. There is a worldwide variation in the prevalence of asthma. The largest study group which has conducted a study on the prevalence of CBA by International Study of Asthma and Allergies in Childhood.<sup>1</sup> The reported prevalence of CBA according to the study was about 25%. It varies from region to region in the world as seen in subsequent studies.<sup>2</sup>

Various environmental changes play a major role in the CBA epidemic.<sup>3</sup> The causes are multifactorial and in a country like ours with a vast diversity and increasing incidence of CBA the study on this major health issue in children is

worthwhile. There is no permanent cure of asthma. Hence, prevention plays a pivotal role in reducing its morbidity and mortality. So a thorough analysis and sincere approach to the various issues in children with asthma can alleviate their symptoms to a greater extent. This study was conducted in the Asthma clinic of the Department of Paediatrics with an aim to understand the various risk factors and its spectrum in these children.

## MATERIALS AND METHODS

A prospective analysis of children attending the Asthma clinic of Department of Paediatrics, Amala Institute of Medical Sciences, Thrissur, Kerala, India were included in the study. A detailed analysis was conducted with the proforma having special reference to age, sex, age of onset, symptomatology and trigger factors. Detailed examination and relevant investigations and was categorized and managed. Children with congenital heart diseases and structural lung diseases were excluded from the study. A written consent was obtained from the subjects or from their relatives. The study design was approved by Institutional Ethics Research Committee.

## RESULTS

Total of 100 children (35 males and 65 females) were included in the study (Figure 1). Among the subjects of age ranges from 7 months to 18 years, 4% were less than 1 year of age, 30% were in the age group 1-3 years, 32% in 4-6 years, 23% in 7-10 years and 11% above 10 years group (Table 1). Of the various risk factors, parental asthma was seen in 70% of the children; 69% had severe lower respiratory tract infection less than 2 years; 36% had environmental tobacco exposure and 11% were low birth weight (Table 2). The trigger was infection (54%) and allergy (47%), 9% had both infection and allergy (Table 3). 34% had exercise induced asthma. Among the various allergens acting as triggers, cotton bed and pillow used were the most common (63%) (Figure 2).

The first attack of asthma was at less than 1 year of age in

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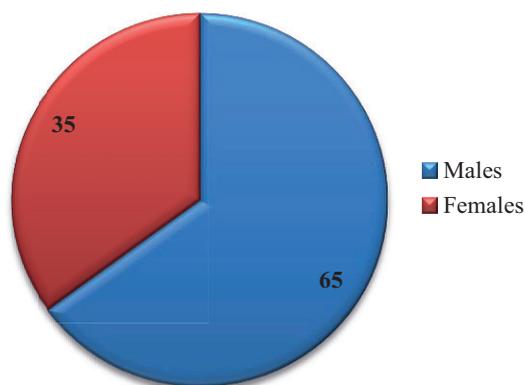


Figure-1: Distribution of sex of the study subjects

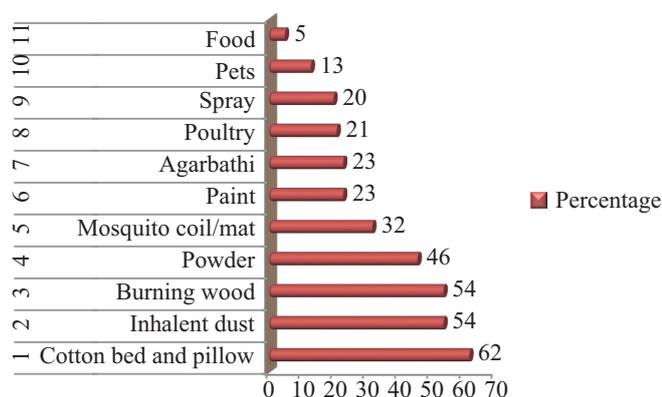


Figure-2: Distribution of various allergens

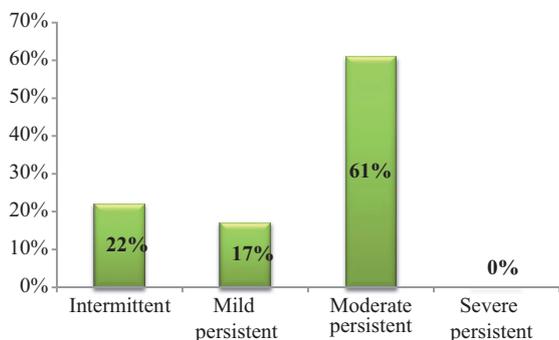


Figure-3: Distribution of asthma severity

52% of patients. 22% had mild intermittent asthma, 17% had mild persistent and 61% moderate persistent asthma (Figure 3). None of them had severe persistent asthma. 42% were on inhaled steroids. Regular follow up was seen in 56% of patients. Good compliance was seen only in 26% of the study population.

**DISCUSSION**

Asthma is a leading cause of chronic illness in childhood and most often starts early in life and has variable courses and unstable phenotypes which may progress or remit over time.<sup>1,2</sup> CBA is strongly associated with allergy, especially in developed countries.<sup>1-3</sup> The gradual increase in the incidence of CBA over the past few years and the geographic variation in its prevalence rates and the magnitude is directly linked to the environmental changes that play a major role in

Age group	Percentage
Less than 1 year	4
1 to 3 years	30
4 to 6 years	32
7 to 10 years	23
More than 10 years	11

**Table-1** Distribution of age

Sl. No	Risk factor	Percentage
1.	Parental asthma	70
2.	Lower respiratory infections	69
3.	Tobacco exposure	36
4.	Low birth weight	11
5.	Atopy	43
6.	Allergic rhinitis	13

**Table-2:** Risk factors for asthma

Sl No	Trigger	Percentage
1	Infection	54
2	Allergens	47
3	Mixed	9
4	Exercise	34
5	Drugs	0

**Table-3:** Various triggers for asthma

the CBA epidemic.<sup>4</sup> Many national and international studies have also thrown light into the epidemiology of CBA.<sup>5</sup> Wheeze in preschool children may result from a number of different conditions around half of preschool wheezers become asymptomatic by school age irrespective of treatment. Abnormal lung function has been documented by Lowe et al.<sup>6</sup> in their study in preschool children with persistent wheezing as young as age 3 years. Martinez et al.<sup>7</sup> identified the spectrum of CBA in the first six years of life. Among the 100 children with asthma in the study 4% were less than 1 year of age, 30% were in the age group 1-3 years, 32% in 4-6 years, 23% in 7-10 years and 11% above 10 years group. About 34% children were in the preschool age group. Martinez et al.<sup>7</sup> identified that even though some 50% of preschool children in their cohort have wheezing, only 10%–15% have a diagnosis of “true” CBA by the time they attain the school age.

Sex affects the development of CBA as the growth of the child progresses. The incidence and prevalence of CBA are greater among boys than among girls until the age of 13–14 years. Studies through puberty have shown a greater incidence of CBA among adolescent and young adult female and a greater proportion of males children with remission of CBA.<sup>8,9</sup> Nicolai et al.<sup>9</sup> have attributed these changes in prevalence and severity to events of puberty. In the present study, 35% were female children and there was a male predominance as is seen in other studies.<sup>8,9</sup>

The spectrum of risk factors in the causation of CBA is many. New-onset CBA can occur at any age, without any prior illness or disease process. There are many risk factors for CBA such as allergic sensitization, decreased lung function in infancy, family size and structure, socio-economic status,

antibiotics and infections, and sex and gender. In our study we analysed the risk factors such as parental asthma in these children, severe lower respiratory tract infection less than 2 years, environmental tobacco exposure, low birth weight, atopy and allergic rhinitis.

Parental asthma especially maternal asthma has been postulated as a risk factor for the development of CBA.<sup>10</sup> Wickens et al.<sup>11</sup> in their study in New Zealand observed even paternal asthma as a risk factor of CBA. Mrazek et al.<sup>12</sup> predicted the development of early-onset asthma in genetically at-risk children and in low birth weight babies. The repeated lower respiratory tract infection may affect the paediatric population who are already at risk for CBA due to family history or atopy. Children born to mothers with allergy or asthma have a relatively persistent maturational defect in Th1 (T helper 1) cytokine synthesis in the first year of life, which may play a role in the development of persistent or severe viral infections. Friedlander et al.<sup>13</sup> postulated that severe viral infection of the lower respiratory tract in genetically susceptible infants who are already sensitized to inhalant allergens may lead to deviation toward Th2 (T helper 2) responses promoting asthma.

Environmental triggers may affect asthma differently at different times of a child's life. Exposure to environmental tobacco smoke also consistently worsens asthma symptoms and is a risk factor for severe asthma.<sup>3</sup> Atopy as a risk factor for asthma is less common with increasing age but occasionally it is the dominant trigger and allergic rhinitis is a concomitant risk factor.<sup>1-5,14</sup> The majority of children ie 34% with persistent wheezing (in whom CBA was diagnosed) experienced their first symptoms before age 3. Of the various risk factors, parental asthma was seen in 70% of the children; 69% had severe lower respiratory tract infection less than 2 years; 36% had environmental tobacco exposure and 11% were born of low birth weight.

The triggers of an asthma could be an infection as manifested by the child developing a fever, signs of upper respiratory tract infection such as a running nose cough and develops wheeze. Various studies highlight the point that there is ongoing interactions of genes with environmental exposures (including allergens, air pollution, environmental tobacco smoke and diet) which modulate the host response to infections. A controversy exists whether the occurrence or timing of childhood infection is pathogenic or protective for the development and long-term outcome of CBA and allergy and of nonallergic wheeze phenotypes.<sup>15,16</sup> Exercise induced CBA is known and is an important entity not to be missed.<sup>1,2,5-7,16</sup> Specific drug treatments (e.g.,  $\beta$ -blockers, nonsteroidal anti-inflammatory drugs) or, in women, the use of hormone replacement therapy, occupational exposure to sensitizing agents or irritants can cause adult asthma.<sup>17</sup> The trigger was infection in 54% and allergy in 47% of children, 9% had both infection and allergy as triggers. 34% had exercise induced asthma. None of the children were on any drugs to cause CBA.

In childhood, airway hyperresponsiveness is more common and more severe among males due to the exposure of vari-

ous allergens.<sup>17,18</sup> Among the various allergens included in the proforma use of cotton bed and pillow, exposure to inhalent dust, burning wood at home and exposure to the smoke, powder, exposure to mosquito coil/mat being used as a repellent, agarbathi, paint, poultry, spray, pets and food as a cause for CBA were asked in detail.

Among the allergens cotton bed and pillow were the most common (seen in 63%) allergen in the study leading onto an asthma attack. The exposures to these allergens are a major cause of CBA and rapid efforts to minimise the contact with these allergens can alleviate the symptoms of CBA.<sup>17-19</sup>

The children were grouped according to the severity of CBA as per the standard guidelines on CBA and managed accordingly.<sup>20</sup> The first attack of asthma was at less than 1 year of age in 52% of patients in the study. Accordingly based on the severity of CBA, 22% had mild intermittent asthma, 17% had mild persistent and 61% moderate persistent asthma. None of them had severe persistent asthma. 42% of the children were on inhaled steroids. A regular follow up was seen in 56% of patients. A good compliance was seen only in 26% of these children.

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# Status of Insulin Resistance and Interleukin-6 (IL-6) in Type- 2 Diabetic Subjects in Eastern Uttar Pradesh of India

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## ABSTRACT

**Introduction:** Diabetes mellitus is a metabolic disorder characterized by hyperglycemia with disturbances of carbohydrate, fat and protein metabolism, resulting from defects in insulin action and secretion or both. The aim of the study is to evaluate the metabolic significance of type-2 diabetic subjects compared to healthy subjects and the independent factors associated with type-2 DM patients.

**Material and methods:** The study was conducted in M.L.N. Medical College, Allahabad (UP). A total of 258 cases were included in our study and diagnosis. Out of these, 158 were type-2 diabetic subjects and 100 were healthy individuals. They were evaluated by measurement of various blood parameters as FBS, HbA1c, TC, TG, HDL-c, LDL-c, VLDL-c, fasting Insulin, Insulin resistance by HOMA-IR calculation method, Tumour Necrosis Factor- $\alpha$ , Interleukin-6.

**Results:** An increase in the levels of FBS, HbA1c, TC, TG, HDL-c, LDL-c, VLDL-c, fasting Insulin, Insulin resistance by HOMA-IR, Tumour Necrosis Factor- $\alpha$ , Interleukin-6 level and a decrease in HDL was observed in diabetic groups. The value of all these study parameters were elevated in diabetes patients and the difference were found to be statically significant.

**Conclusion:** Raised levels of, Proinflammatory cytokines IL-6, TNF- $\alpha$  and fasting insulin are more frequently seen in type-2 diabetic patients. The Chronic hyperglycemia of diabetes is associated with the long-term consequences of diabetes that include damage, dysfunction and failure of various organs, which further lead to the development of cardiovascular problem, retinopathy, neuropathy, nephropathy etc.

**Keywords:** Type-2 DM (type-2 diabetes mellitus), IL-6 (Interleukin-6)

## INTRODUCTION

The Chronic hyperglycemia of Diabetes is associated with the long term consequences of diabetes that include damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels. 50% of people with diabetes die of cardiovascular disease (primarily heart disease and stroke). Diabetes causes about 5% of all deaths globally each year.<sup>1</sup> A close connection between insulin resistance and classic inflammatory signaling pathways has also recently been identified.<sup>2</sup> Insulin resistance is the driving force of hyperglycemia of type- 2 diabetes.<sup>3</sup> Several studies have demonstrated elevated levels of IL-6 individuals with insulin resistance.<sup>4,5</sup> The proinflammatory cytokines have also been shown to be elevated in type-2 diabetes. Proinflammatory cytokine IL-6 has been shown to have the strongest correlation with insulin resistance and type-2 diabetes.<sup>6</sup>

aims and objectives of the research were to know the level of inflammatory marker (IL-6) in type 2 diabetic subjects, to explore the status of biochemical parameters in type 2 diabetic subjects and to find out the correlation between biochemical and inflammatory marker in age and sex matched type 2 diabetic subjects.

## MATERIAL AND METHODS

The study was carried out in the Department of Biochemistry M.L.N. Medical College, Allahabad between November 2013 and May 2015. All ethical measures were taken prior and during the study. The written consent of patients was also taken before starting the study. The study was done on 258 individuals, who included 158 type-2 diabetic subjects and 100 healthy individuals. All diabetic patients were on medication with oral hypoglycemic drugs. Age matched healthy control subjects were selected from known families. A record of clinical history and previous investigations of patients disorders were compiled in a proforma (Proforma enclosed). A proforma containing the relevant findings of clinical, biochemical and physiological investigations were recorded on preset questionnaire as base line record. The blood sample was analyzed for biochemical and immunological investigations which include: Fasting Blood Sugar (FBS), Glycosylated hemoglobin (HbA1c), Total Cholesterol (TC), Triglyceride (TG), High density-lipoprotein cholesterol (HDL-c), Low density lipoprotein cholesterol (LDL-c), Very low density lipoprotein cholesterol (VLDL-c), fasting Insulin, Insulin resistance by HOMA-IR calculation method, Interleukin-6. All parameters were given as mean $\pm$  standard deviation (SD). The criterion for significance was  $P < 0.05$ . Pearson's correlation was used to evaluate the correlations between the variables. Data analyses were performed with the Statistical Package for the Social Sciences, version 16.0 (SPSS, Chicago, Illinois, USA).

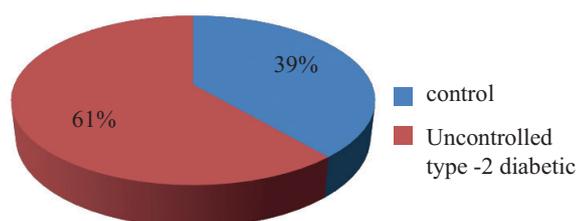
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Study Variables	Control n=100	Uncontrolled type -2 diabetic n=158	t-value	P-Values
FBS(mg/dl)	76.42±12.32	166.09±37.7	5.42	<0.001
HbA <sub>1c</sub> (%)	4.12±0.82	8.12±1.46	7.04	<0.001
Total Cholesterol (mg/dl)	162.72±21.09	253.94±44.62	9.08	<0.001
TG (mg/dl)	123.09±18.02	171.46±32.05	7.62	<0.001
HDL (mg/dl)	52.36±7.24	34.47±3.44	5.28	<0.01
LDL (mg/dl)	91.31±24.52	132.7±24.3	2.58	<0.01
VLDL (mg/dl)	25.58±4.19	54.89±16.8	1.96	<0.05
Fasting Insulin (μU/ml)	6.13±1.26	17.32±2.10	3.29	<0.001
HOMA-IR	1.34±0.30	5.47±1.24	2.57	<0.01
IL-6 (pg/ml)	8.85±1.46	18.32±4.86	5.68	<0.001

**Table-1:** Comparison of laboratory abnormalities between control healthy and uncontrolled type-2 diabetic subjects.



**Figure-1:** Showing the percentage of total number of subjects

## RESULTS

The study included 100 healthy individuals and 158 controlled type-2 diabetic. The average age of the patients was  $52 \pm 8$  years (Ranging from 36 to 74). Comparison of means of serum biochemical markers between healthy control and diabetic groups is presented in Table-1. The values of all these biochemical study parameters except HDL were elevated in uncontrolled diabetic patients as compared to healthy control group and the differences were found to be statistically significant (P value <0.05, <0.01 and <0.001). Values are given mean and standard deviation, mean difference is significant at  $P < 0.05$ , mean difference is significant at  $P < 0.01$ , mean difference is highly significant at  $P < 0.001$ .

## DISCUSSION

Chronic hyperglycemia in diabetes is associated with specific micro and macro-vascular pathology affecting many tissue and organs, causing retinopathy, nephropathy, neuropathy, cardiovascular diseases, and peripheral vascular diseases.<sup>7,8</sup> Our study showed FBS levels in uncontrolled diabetic groups (mean  $166.09 \pm 37.7$ ) were higher than healthy control group (mean  $76.42 \pm 12.32$ ), which confirmed the obvious dysglycemia in these patients (P value <0.001). Glycosylated hemoglobin was also increased in diabetic subjects.<sup>9-11</sup> The increase in HbA<sub>1c</sub> is due to high concentration of glucose present in both inside and outside the cells favouring the occurrence of spontaneous and non-enzymatic reactions between glucose and protein in intra and extracellular compartments resulting in advanced glycation end products.<sup>12</sup> We also observed that mean values of TC, TG, LDL-c and VLDL-c were found significantly increased whereas HDL-c was also found significantly decreased in uncontrolled diabetic groups as compared to control healthy group and the

results were statistically significant. In a correlation coefficient analysis TC, TG, LDL-c and VLDL-c were also found to be positively correlated with uncontrolled diabetic population. This study is mainly focusing on the possible role of proinflammatory marker interleukin-6 along with insulin resistance in type -2 diabetic subjects. In our study we found that strong positive correlation of FBS with proinflammatory marker IL-6 in uncontrolled type 2 diabetic subjects. FBS was also positively correlated with HOMA-IR in uncontrolled diabetic subjects.

Both newly diagnosed or established patients with type-2 DM have shown that acute phase reactants and proinflammatory cytokines are positively correlated with insulin resistance.<sup>13,14</sup> Increase IL-6 levels have been linked to inhibition of hepatic glycogen synthase, activation of glycogen phosphorylase and lipolysis and increase triglyceride production.<sup>15,16</sup> As a result of these observations, it has been hypothesized that IL-6 plays a role as a gluoregulatory hormone.

## CONCLUSION

In conclusion, the pathogenetic vision of diabetes mellitus has changed in the last few years, where inflammatory markers IL-6 and fasting insulin levels are playing pivotal roles in the development of Type-2 Diabetes Mellitus due to Insulin resistance and in the progression of complications in type-2 DM. These new pathogenetic factors have lead to a considerable amount of new therapeutic approaches. Modulation of inflammatory processes in the setting of diabetes is now a days a matter of great interest.

## FUTURE SCOPE

It is possible that in coming years the hope of new therapeutic strategies based on anti-inflammatory properties with beneficial actions on diabetic complications can be translated in to real clinical treatments.

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# Study of Cases of Mesial Temporal Sclerosis Diagnosed on MRI

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## ABSTRACT

**Introduction:** Temporal lobe epilepsy is the most common epilepsy syndrome in adults. In most patients, the epileptogenic focus involves the structures of the mesial temporal lobe. These structures include the hippocampus, amygdala and parahippocampalgyrus. MRI is the modality of choice to evaluate the hippocampus, however dedicated temporal lobe epilepsy protocol needs to be performed if good sensitivity and specificity is to be achieved. The purpose of this study is to evaluate the prevalence of Mesial Temporal sclerosis in our tertiary care setup and to study the MR findings in patients of Mesial Temporal Sclerosis.

**Material and Methods:** MR scans (epilepsy protocol done by 1.5T MRI) of 92 patients who presented with clinical features of temporal lobe epilepsy or partial seizures in the study period of 6 months were reviewed retrospectively. Imaging findings were described and tabulated and prevalence of mesial temporal sclerosis calculated.

**Results:** 25 out of 92 (27.2%) patients who had done MRI brain for clinical suspicion of temporal lobe epilepsy or partial seizures had mesial temporal sclerosis. Increased signal intensity of hippocampus constituted the commonest imaging finding seen in 21 out of 25 (84%) patients and it was best visualized in coronal T2 FSE high resolution images.

**Conclusion:** Mesial Temporal Sclerosis was the most common identifiable cause of seizures in our study. Of the six features described in cases of mesial temporal sclerosis on MRI, increased hippocampal signal intensity is the most consistent. Temporal lobe epilepsy protocol increases the sensitivity and specificity of the diagnoses compared to routine MRI brain study.

**Keywords:** MTS Brain, Epilepsy, MR epilepsy protocol, Temporal lobe epilepsy, Mesial sclerosis

continue to have partial seizures. When seizures persist, anterior temporal lobectomy is the treatment of choice.

The purpose of this study is to evaluate the prevalence of Mesial Temporal Sclerosis in our tertiary care setup and to study the MR findings in patients of Mesial Temporal Sclerosis.

## MATERIALS AND METHODS

Study period: 6 months (25-3-2014 to 25-9-2014), Type of study: Retrospective study

**Inclusion criteria:** Cases of epilepsy with clinical features of temporal lobe epilepsy or partial seizures for which MRI brain was done during the study period.

**Methods:** MRI of Brain Epilepsy - imaging protocol (1.5T G.E. Scanner), T1W sagittal images for localizing the hippocampus, Axial FLAIR sequence, Coronal high-resolution T2 FSE and FLAIR perpendicular to hippocampal axis (2 mm) and Isotropic T1WI 3D inversion recovery SPGR.

92 patients had done MRI of brain (epilepsy protocol) for complaints of epilepsy or partial seizures during the study period of 6 months. Out of these 92 patients, 25 were diagnosed on MRI as having Mesial Temporal Sclerosis. MRI scans of the patients during the study period were retrieved from archives and reviewed retrospectively. Imaging findings of Mesial Temporal Sclerosis were described and tabulated and prevalence calculated.

## RESULTS

Feature: 1 is - increased signal intensity in the hippocampus; 2- hippocampal atrophy or volume loss; 3- collateral white matter atrophy; 4- enlarged temporal horn; 5-diminished gray-white matter demarcation; and 6- smaller temporal lobe. (R: Right side, L: Left side, B/L: Bilateral involvement) Details of the table: 25 out of 92 (27.2%) patients who had done MRI brain for clinical suspicion of temporal lobe epilepsy or partial seizures had mesial temporal sclerosis. Increased signal intensity of hippocampus constituted the commonest imaging finding seen in 21 out of 25 (84%) patients

## INTRODUCTION

Temporal lobe epilepsy is the most common epilepsy syndrome in adults. Seizures usually begin in late childhood or adolescence. Virtually all patients have complex partial seizures, some of which generalize secondarily. In most patients, the epileptogenic focus involves the structures of the mesial temporal lobe. These structures include the hippocampus, amygdala and parahippocampal gyrus. Mesial temporal sclerosis is the commonest cause of partial complex seizures.<sup>1-4</sup>

Magnetic resonance imaging (MRI) is the imaging investigation of choice for the diagnosis and has been shown to be highly sensitive and specific, however dedicated temporal lobe epilepsy protocol needs to be performed if good sensitivity and specificity are to be achieved.<sup>3,4</sup>

Anti-epileptogenic drugs usually suppress secondary generalized seizures successfully but 50% of patients or more will

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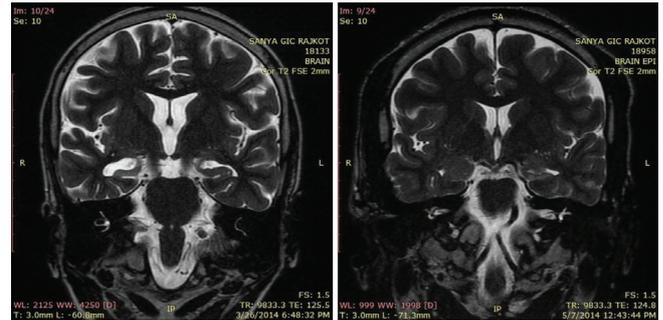
Patient	Side	MRI features					
		1	2	3	4	5	6
1.	R	+	-	-	-	-	-
2.	R	+	+	-	+	-	-
3.	R	+	+	-	-	-	-
4.	L	+	-	-	-	-	-
5.	L	+	+	+	+	-	+
6.	R	+	+	-	+	-	-
7.	L	+	-	-	-	+	-
8.	R	+	-	-	-	-	-
9.	L	+	+	-	+	-	-
10.	L	-	+	-	-	-	-
11.	R	+	+	-	-	-	-
12.	R	-	+	+	-	-	+
13.	L	+	+	-	+	-	-
14.	L	-	+	-	-	-	-
15.	R	+	+	-	-	-	-
16.	B/L	+	+	-	+	-	+
17.	L	+	-	+	+	-	+
18.	L	-	+	-	-	-	-
19.	L	+	-	-	-	-	-
20.	L	+	-	-	+	-	+
21.	R	+	+	-	+	-	-
22.	R	+	+	-	-	-	-
23.	L	+	+	+	-	-	+
24.	B/L	+	+	+	+	-	+
25.	L	+	-	+	-	-	+
Total 25		21	17	6	10	1	8

**Table-1: MRI features**

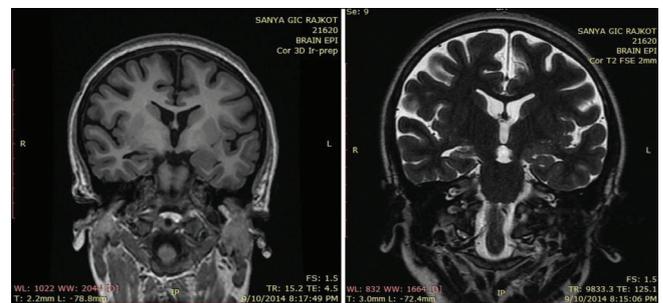
and it was best visualized in coronal T2 FSE high resolution images. Hippocampal atrophy or volume loss was seen in 17 out of 25 (68%) patients. Collateral white matter atrophy, enlarged temporal horn and smaller temporal lobe was seen in 6/25 (24%), 10/25 (40%) and 8/25 (32%) patients respectively. Diminished gray-white matter demarcation was the rarest finding seen in only 1 of 25 (4%) patients diagnosed with mesial temporal sclerosis. The disease was bilateral in 2 of 25 (8%) cases and affected the left side (13 of 25; 52%) more frequently as compared to the right (10 of 25; 40%).

**DISCUSSION**

In the present study, MRI of Brain (Epilepsy protocol) of 92 patients, who presented with clinical features of temporal lobe epilepsy or partial seizures during the study period of 6 months were reviewed retrospectively. Out of these 92 patients, 25 were diagnosed as having Mesial Temporal Sclerosis. Mesial temporal sclerosis is the commonest histopathological finding in the patients undergoing surgery for temporal lobe epilepsy. It has been postulated that mesial temporal sclerosis may be related to a complicated delivery<sup>1</sup>, febrile convulsions during childhood<sup>2-4</sup> and status epilepticus.<sup>5</sup> These circumstances are believed to cause metabolic disturbances in neurons in the hippocampus, which may disappear and subsequently be replaced by gliosis.<sup>5</sup> This may lead to a change in signal intensity on MRI and a reduction in size of the hippocampus. Although MRI has proved much



**Figure-1:** Coronal T2W FSE image showing right hippocampus region hyperintensity, volume loss with loss of head digitations and collateral white matter atrophy, volume loss in right temporal lobe and dilation of temporal horn of right lateral ventricle; **Figure-2:** Coronal T2W FSE image showing volume loss and hyperintensity in left hippocampus.



**Figure-3:** Coronal 3D IR sequence showing atrophy and volume loss of right hippocampus and of right mamillary body with dilatation of temporal horn of right lateral ventricle; **Figure-4:** Coronal T2 FSE image showing atrophy and hyperintensity of right hippocampus with dilatation of temporal horn of right lateral ventricle.

more sensitive than computed tomography in the detection of mesial temporal sclerosis<sup>6</sup>, the incidence of mesial temporal sclerosis on MRI differs significantly between studies investigating patients with drug-resistant temporal lobe epilepsy (8% found by Brooks et al.<sup>7</sup>; Gates and Rodriguez, 55%<sup>8</sup>; Heinz, 62%<sup>9</sup>; Dowd, 64%<sup>10</sup>; Kuzniecky, 70%<sup>11</sup>; and 93% in a study by Jackson et al<sup>12</sup>). Various authors have proposed criteria for the diagnosis of mesial temporal sclerosis on MRI.<sup>7,8,11,13,14</sup> The optimal planes and sequences for the depiction of the hippocampus suggested by different authors<sup>12</sup> are the coronal and the axial images parallel to the temporal fossa or to the hippocampus using a T2-weighted sequence.<sup>12</sup>

**MRI FEATURES OF MESIAL TEMPORAL SCLEROSIS**

- 1. Increased Signal Intensity in the Hippocampus:** (Fig: 1, 2 and 4) This MR criterion in the pathologic hippocampus is the most common finding in this study. It was seen in 21 out of 25 of our cases. Coronal high-resolution T2 FSE sequence perpendicular to hippocampal axis was most sensitive for detection of the feature.
- 2. Reduction in Size of the Hippocampus:** (Fig: 1, 2, 3 and 4) The decreased hippocampal size was the next most common finding (17 out of 25 patients). This criterion may be best assessed on the coronal images, the inversion-recov-

ery sequence being slightly better than the others. However, care has to be taken to obtain the images in an exact coronal plane, if necessary, using images angulated along the left-right axis as well as the caudal-cranial axis. The axial plane is inferior to the coronal plane for the depiction of this feature. The reduced hippocampal size would be expected to be present in all cases, as a result of scarring and retraction. However, it was not seen in all of our patients. In our study all patients with decreased hippocampal size showed concomitant ipsilateral increased signal on T2-weighted images.

**3. Atrophy of Collateral White Matter Adjacent to the Hippocampus:** (Fig: 1) The inversion-recovery sequence demonstrates a local reduction of the volume of the adjacent collateral white matter; however, it is well demarcated from the neighboring gray matter. A subtle rotated position of the patient's head may influence this finding so use of this feature for the diagnosis should be done only in combination with the other criteria for mesial temporal sclerosis.

**4. Enlargement of the Temporal Horn of the lateral ventricle:** (Fig: 1, 3 and 4) Based on findings in our 25 patients, we suggest that the criterion of a larger temporal horn is relevant for the diagnosis of mesial temporal sclerosis only if the ipsilateral hippocampus is smaller. If the hippocampi are symmetrical in size and signal intensity, an enlarged temporal horn may be considered a normal variant or the result of loss of temporal lobe parenchyma from causes other than mesial temporal sclerosis. The enlarged temporal horn was well appreciated in all planes and on T2-weighted and inversion-recovery sequences, the latter being slightly better. It was present in 10 out of 25 patients.

**5. Diminished Gray-White Matter Demarcation in the Temporal Lobe:** In the present study the reduced distinction between gray and white matter of the temporal lobe was an infrequent finding. The underlying cause of the altered gray-white matter distinction is not clear.

**6. Reduction in Size of the Temporal Lobe:** (Fig: 1) In this study the criterion of a reduced size of the temporal lobe was not considered an indication of mesial temporal sclerosis if it was a solitary finding. Jack et al<sup>15</sup> have measured the volumes of temporal lobes in patients without epilepsy and came to the conclusion that the left temporal lobe generally is slightly but significantly larger than the right temporal lobe. Reduced temporal lobe size was noted in 8 out of 25 patients and was best appreciated on the coronal inversion-recovery images.

## CONCLUSION

Mesial Temporal Sclerosis was the most common identifiable cause of seizures in our study. Mesial temporal sclerosis may have different appearances on MR images, resulting in a combination of above mentioned six features, of which increased hippocampal signal intensity is the most consistent finding. MR imaging with epilepsy protocol increases the sensitivity and specificity of the diagnoses compared to routine MRI brain study. The subtlety of the abnormalities of mesial temporal sclerosis on MR and the associated artifacts and pitfalls in the different scanning planes necessitate the use of multiple planes for confirmation.

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# Histopathological Patterns and Cytonuclear Grade of Ductal Carcinoma in situ Occurring Concurrent with Infiltrating Ductal Carcinoma of the Breast

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## ABSTRACT

**Introduction:** The presence of ductal carcinoma in situ (DCIS) confers an improved prognosis for patients with infiltrating carcinoma. Different architectural patterns and cytonuclear grades of DCIS have different prognosis. A number of classification systems of DCIS have been developed, but there is a lack of uniformity in the diagnosis and prognostication of this disease. Therefore, in this study different architectural patterns of DCIS along with their cytonuclear grade were evaluated and further correlated with histological grades of infiltrating ductal carcinoma (IDC) in patients having concurrent DCIS with IDC.

**Materials and Methods:** The present study included 100 cases of DCIS occurring concurrent with IDC of the breast in a tertiary care hospital. Histopathological examination was done for studying the different architectural pattern and cytonuclear grades of DCIS along with the histological grades of IDC. The correlation of architectural patterns and nuclear grade of DCIS with histological grades of IDC was evaluated.

**Results:** The comedo pattern DCIS was significantly associated with grade III IDC, (p value 0.001) whereas the cribriform and micropapillary pattern were found to be associated with grade II and I IDC (p value=0.001). The association of the nuclear grade with histological grade of IDC was also found to be statistically significant (p value <0.0013).

**Conclusion:** Comedo pattern DCIS is usually associated with grade III IDC whereas cribriform and micropapillary patterns are usually associated with lower grade IDC. Similarly, high nuclear grade of DCIS usually results in high grade IDC. This knowledge can help in better timely management of the patients.

**Keywords:** Breast, Ductal Carcinoma In Situ, Infiltrating ductal carcinoma, comedo, histological grade

as well as lack of diagnostic facilities in the periphery. Most of the patients remain asymptomatic and usually present with an invasive form of breast cancer. So, the majority of DCIS occur in association with invasive carcinomas. Histopathological studies of invasive carcinoma with an associated in situ component have shown a close link between the grade of the in situ component and that of the invasive component. Patients having breast tumor with both DCIS and infiltrating ductal carcinoma have a different prognosis than patients with invasive carcinoma without DCIS.<sup>3</sup> The patients who present with concurrent DCIS have superior survival characteristics.<sup>4</sup>

Increased prevalence of DCIS has produced growing awareness of the importance of its diverse architectural patterns. These differences in pattern are clinically significant as they are important markers of prognosis. DCIS is generally categorized by architectural description into four groups - comedo, solid, cribriform, and micropapillary.<sup>5</sup> However, significant heterogeneity is observed between architectural patterns and mixed patterns can be seen in a single case.<sup>6</sup>

The appropriate classification of DCIS has provoked much debate; a number of classification systems have been developed, but there is a lack of uniformity in the diagnosis and prognostication of this disease. Most DCIS classification systems take into account architectural features only, however nuclear grade (high, intermediate and low) and absence or presence of necrosis are important prognostic markers.<sup>7</sup>

It is universally accepted that the nuclear grade is one of the most essential features and there exists an association between the nuclear grade and the architectural pattern.<sup>8</sup> Comedo type DCIS with a high nuclear grade is biologically more aggressive than other patterns of DCIS and more likely to progress rapidly to invasive carcinoma.<sup>9</sup> A positive correlation between the architectural pattern of DCIS and the grade of the invasive component has been noticed. In addition, significant association between nuclear grade of DCIS and

## INTRODUCTION

Breast cancer is the most common cancer diagnosed in women worldwide.<sup>1</sup> Ductal carcinoma in situ is a proliferation of malignant appearing cells of the ducts and terminal lobular units of the breast that have not yet breached the basement membrane. It represents an intermediate step between normal breast tissue and invasive breast cancer. It has been estimated by multiple mammography screening trials that the incidence of DCIS that will progress into invasive breast cancer if untreated is 100-270 per 100, 000.<sup>2</sup>

In the last several decades, the incidence of DCIS has increased dramatically, due largely to screening mammography. In developing countries like India, the rate of detection of DCIS remains low due to lack of screening programmes

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histological grade of infiltrating carcinoma has also been observed.<sup>10</sup> However, there are variable reports in the literature and exact association is difficult to estimate from the present studies.

The study was planned to determine the various histomorphological patterns of DCIS occurring concurrent with infiltrating ductal carcinoma of breast using architectural and cytonuclear grade and further to correlate the architectural patterns and nuclear grade of DCIS with histological grade of infiltrating carcinoma.

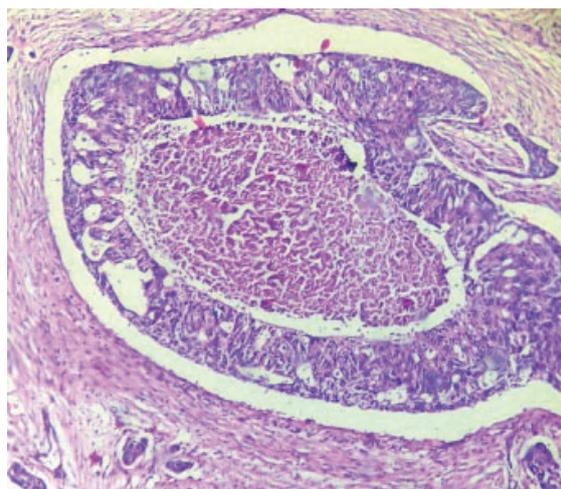
## MATERIALS AND METHODS

The present study included 100 cases of DCIS occurring concurrent with infiltrating ductal carcinoma of the breast in a tertiary care hospital. Mastectomy and lumpectomy specimen that didn't contain DCIS, known and treated cases of invasive carcinoma that had received neoadjuvant chemotherapy and were showing chemotherapy induced changes were excluded from the study. The mastectomy and lumpectomy specimens were fixed in 10% formalin. Multiple sections were taken from the representative sites and after processing, paraffin blocks were prepared. Sections from paraffin blocks were stained with Haematoxylin and Eosin stain. On the basis of architectural pattern DCIS was classified into four major patterns, namely comedo, solid, micropapillary and cribriform. Architecturally, DCIS was divided into single or pure when only one pattern was seen and as mixed when more than one pattern was present. Based upon Consensus Conference Committee recommendations for nuclear grading of intraductal carcinoma DCIS was graded into high grade (nuclear diameter -  $>2.5X$  RBC, significant pleomorphism, vesicular chromatin, prominent nucleoli, conspicuous mitosis), intermediate grade (nuclear diameter -  $2-2.5X$  RBC, mild pleomorphism, coarse chromatin, inconspicuous nucleoli, infrequent mitosis) and low grade (nuclear diameter -  $<2X$  RBC, no pleomorphism, diffuse chromatin, absent nucleoli, occasional mitosis). Infiltrating ductal carcinoma was graded according to Nottingham modification of Bloom and Richardson system which takes into account tubule formation, mitotic activity and nuclear pleomorphism. The statistical correlation between architectural patterns and cytonuclear grade of DCIS with the histological grade of IDC was evaluated with the help of Chi-square test and SPSS computer software.

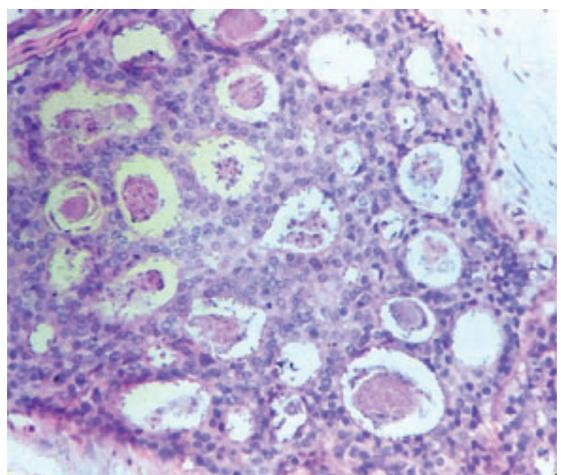
## RESULTS

Age range of the patients was 31-78 years with a mean age of 53 years. On analyzing the architectural patterns of DCIS 69 cases (69%) displayed single growth pattern and 31 cases (31%) showed a mixed growth pattern. Out of the 69 cases of single pattern DCIS, comedo pattern (Fig 1) was seen in 35 cases (51%), whereas solid, cribriform and micropapillary patterns were seen in 24 cases (35%), 8 cases (11%) and 2 cases (3%) respectively. In the mixed type DCIS, solid with comedo mixed pattern was present in 14/31 cases (45.3%), solid with cribriform mixed pattern was identified in 13/31

cases (41.9%), solid with micropapillary mixed pattern DCIS was seen in 3/31 cases (9.6%) and solid with micropapillary and comedo mixed pattern was seen in 1/31 cases (3.2%). The nuclear grading was done in all the cases; low nuclear grade was recognized in 11 cases (11%), intermediate nuclear grade in 43 cases (43%) and high nuclear grade in 46 cases (46%). Low grade was present in 9/69 cases (13.1%) of DCIS with a single architectural pattern, whereas 24/69 cases (34.8%) and 36/69 cases (52.1%) were having intermediate and high grade respectively. In the mixed architectural pattern DCIS, low grade was observed in 2/31 cases (6.4%), intermediate grade in 19/31 cases (61.4%) and high nuclear grade in 10/31 (32.2%) cases. 68.6% of comedo DCIS had grade nuclei and 31.4% had intermediate grade nuclei whereas none of the comedo DCIS revealed low grade nuclei. 50% of the solid DCIS cases were showing high grade nuclei and each of the intermediate and low grade nuclei were seen in 25% cases. Most of the cribriform DCIS cases (75%) were seen to have intermediate grade nuclei and rest of the 25% cases had low grade nuclei (Fig. 2). Micropapillary DCIS had low (50%) to intermediate (50%) grade nuclei. It was interesting to note that none of the micropapillary and cribriform DCIS cases had high grade nuclei. On histological



**Figure-1:** Comedo Pattern DCIS (H&E 100x)



**Figure-2:** Cribriform pattern DCIS with low nuclear grade (H&E 400x)

Histological grade IDC (Bloom Richardson)	Solid (n=24)	Comedo (n=35)	Cribriform (n=8)	Micropapillary (n=2)	Mixed Pattern (n=31)
Grade 1	11 (46%)	0	1(12.5%)	2 (100%)	3 (10%)
Grade 2	13(54%)	13(37%)	7(87.5%)	0	21 (68%)
Grade 3	0	22(63%)	0	0	7(22%)
Total	24	35	8	2	31

**Table-1:** Correlation of histological grade of IDC with architectural patterns of DCIS

Histological Grade IDC (Bloom Richardson)	High Grade DCIS (n=49)	Intermedi-ate Grade DCIS(n=43)	Low Grade DCIS(n=8)
Grade I	4(8%)	6(14%)	7(87.5%)
Grade II	22(45%)	31(72%)	1(12.5%)
Grade III	23(47%)	6(14%)	0
Total	49	43	8

**Table-2:** Association of the nuclear grade of DCIS with histological grade of IDC

grading of all the 100 IDC cases by using Nottingham modification of Bloom and Richardson grading system 17 cases (17%) were found to have grade I, 54 cases (54%) grade II and 29 cases (29%) grade III IDC. The correlation of histological grading of IDC with architectural patterns of DCIS is shown in Table 1. The comedo pattern DCIS was significantly associated with grade III IDC, (p value of 0.001) and solid pattern with grade II IDC (p value 0.001). The cribriform and micropapillary pattern were found to be associated with grade II and I IDC. (p value=0.001). The association of the nuclear grade with histological grade of IDC (Table 2) was also found to be statistically significant (p value <0.0013).

**DISCUSSION**

Various classification schemes have been used to grade DCIS, which are primarily based on architectural pattern, nuclear grade and the presence or absence of necrosis. These classification systems are useful in predicting the biological behavior of DCIS as well in surgical management.<sup>11</sup> There is merit in comparing the morphologic features and biologic profile of the preinvasive tumor with those of the concurrent IDC. A biologic similarity of both lesions supports their clonal relationship, and comparison of the grade of DCIS and IDC validate the relevance of the DCIS grading system. When DCIS is associated with a concurrent IDC, it is likely to be one of similar grade and similar biologic characteristics, suggesting that they represent neoplastic cells of the same clonal population. DCIS can show single as well as mixed architectural patterns of growth. In the present study, 69% cases were showing single and 31% cases were showing mixed architectural patterns of growth. Comedo pattern was the most common (51%) single architectural pattern. This is because comedo DCIS is seen more in mixed DCIS/ IDC cases as compared to pure DCIS cases.<sup>12</sup> Non comedo DCIS has been associated with a lesser risk of recurrence after wide local excision as compared to comedo DCIS which has been associated with more recurrences after tylectomy and a significantly large number of of biopsy proven come-

do DCIS cases tend to show invasive stromal component on subsequent mastectomy.<sup>13,14</sup> In the present study, a significant association was noticed between architectural pattern of DCIS and histological grade of IDC. Grade III IDC was present in 63% cases of comedo pattern DCIS, grade II in 37% of comedo DCIS and none of the cases of grade I IDC had comedo pattern DCIS. Conversely, none of the grade III IDC cases had micropapillary or cribriform pattern DCIS. However, there is marked disagreement between the observers when assessment is made using architectural pattern alone. Therefore, the traditional architectural classification of DCIS has been criticized on the ground that individual lesions often show more than one pattern resulting in a large mixed category.<sup>15</sup> Apart from the comedo DCIS, which has been shown in many studies to be an aggressive lesion, other architectural patterns are not predictive of biological behavior of DCIS.<sup>16,17</sup> Hence, this has led to the development of newer classification schemes which incorporate cytonuclear grade and the presence or absence of necrosis.

There exists an association between the architectural growth pattern and the nuclear grade of DCIS. Comedo DCIS have a higher nuclear grade whereas most micropapillary and cribriform in situ carcinomas are of low nuclear grade and relatively indolent. Centrally necrotic comedo architectural pattern is usually not found in cases with low grade DCIS.<sup>18,19</sup> In the present study, 68.6% of comedo DCIS had high nuclear grade, 31.4% had intermediate grade nuclei and none was seen with low grade DCIS. All cases of cribriform and micropapillary DCIS had intermediate to low grade nuclei; none was seen to have high grade nuclei.

Histopathological studies of invasive carcinoma with an associated in situ component have shown a close link between the grade of the in situ component and that of invasive component. DCIS nuclear grade 1 or 2 is usually associated with well or moderately differentiated infiltrating ductal carcinoma, whereas majority of grade 3 DCIS are associated with poorly differentiated carcinoma.<sup>20</sup> In the current study, 87.5% cases of low grade DCIS were associated with grade I IDC, 72% of intermediate grade DCIS with grade II IDC and 47% cases of high grade DCIS were associated with grade III IDC (p value <0.0013).

**CONCLUSION**

In conclusion, evaluation of histomorphological patterns and cytonuclear grading of DCIS occurring concurrent with infiltrating ductal carcinoma is important. This is because it helps in predicting the histological grade of IDC which is one of the most important prognostic factors of the disease. Comedo pattern DCIS is usually associated with grade III IDC,

whereas cribriform and micropapillary patterns are usually associated with lower grade IDC. Similarly, high nuclear grade of DCIS usually results in high grade IDC. Therefore, comedo pattern DCIS cases with high grade nuclei are more likely to have high grade IDC and this can help in better timely management of the patients.

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# Resin Bonded Bridges: From Crust to the Core – A Review Article

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## ABSTRACT

For more than 30 years resin bonded bridges have proved to be one of the best treatment option for restoration of anterior teeth in most of the cases. During this period there has been a lot of research, modifications and advancement in this field to increase the success rate of resin bonded prosthesis and decrease its failure rate. The dentists are turning towards more cost and time effective management of cases and resin bonded bridges considerably satisfy these needs. This review article therefore includes the history and evolution of the resin bonded fixed dental prosthesis (RBFDP), the type of RBFDP, and the design variations in the resin bonded bridges.

**Keyword:** Resin bonded prosthesis

## INTRODUCTION

There are several treatment dilemmas where conventional fixed or removable prosthesis do not appear completely satisfactory. In the adolescent, many factors influence the prosthetic therapy, tooth development, occlusal development and esthetics. It should preserve tooth structure and should not limit the future treatment options in adulthood. Tissue supported acrylic removable partial dentures have some disadvantages, particularly soft tissue and periodontal inflammation. Fixed prosthesis also has a certain amount of failure rate due to insufficient crown length, also in young teeth that possess large pulp chambers tooth preparation becomes difficult. Therefore, a resin bonded fixed dental prosthesis is a suitable treatment option.

Resin bonded or resin retained bridges are minimally invasive fixed dental prosthesis which rely on composite resin cements for retention. First described in 1970s, the resin bonded bridges have evolved significantly. This article reviews the types of resin bonded bridges, their applications, and clinical considerations.

## EVOLUTIONARY CHANGES IN RESIN BONDED BRIDGES

### Bonded pontic

These are the earliest resin bonded prosthesis, introduced by Ibsen and Portnoy in 1973. Extracted/ natural or acrylic teeth were used as pontics. These are bonded directly to the etched enamel. Composite resin connectors are used reinforced with wire or stainless steel mesh framework. These are limited to short anterior spans.<sup>1</sup>

The drawback of this type of prosthesis is degradation of composite resin bond and subsequent fracture. Hence should be given as short term or provisional replacement.

### Rochette bridge

Rochette in 1973, introduced the concept of bonding a metal

retainer to enamel using adhesive resin. His application was to splint periodontally involved mandibular anterior teeth using a cast gold bar bonded to the lingual surfaces of the teeth. The cast metal splint described had perforations to provide mechanical interlocking between the cement and the metal. His introductory article made reference to modifying the technique for application as an RBFDP.

Howe and Denehy modified this application to introduce the first form of RBFDP. Their design recommendation was:

- 1) extending framework to cover maximum area of lingual surface,
- 2) little or no tooth preparation, and
- 3) limitation to mandibular teeth or teeth with minimal occlusal contact.<sup>2</sup>

Livaditis proposed abutment preparation, including reduction of proximal and lingual surfaces to create a path of insertion, along with occlusal rest seat preparation to resist tissueward displacement of the retainer. These modifications enhanced the retention and resistance forms of the metal retainer to the tooth.

### Virginia Bridge

It was first developed at Virginia Commonwealth University, School of Dentistry by Moon and Hudgins in 1984. It has a macroscopic mechanical means of retention.

Fabrication: It is fabricated with the help of a *Lost salt crystal technique*. In this technique specialized salt crystals 150 – 250 u, are sprinkled within the outlines of the retainer leaving a 0.5mm border without crystals on the periphery on a working cast, over which the pattern is adapted. During its fabrication, the salt is dissolved from the pattern giving a rough surface for resin tag formation.

### Maryland Bridge

Maryland bridges are resin bonded bridge using electrolytic etching of metal to retain the metal framework. Thompson and Livaditis in 1983 developed a technique of electrolytic etching of Ni-Cr and Co-Cr alloy.<sup>3</sup>

Advantages of etched cast retainers over cast perforated retainers:

- 1) Improved retention; resin to etched metal bond is strong-

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er than resin to etched enamel. The resin to alloy tensile bond strength was determined to be greater than 20 MPa (2900 psi), while the accepted resin to acid etched enamel bond is approximately 8-10 MPa (1160-1450 psi).

- 2) Oral surface of cast retainers is highly polished which resists plaque accumulation.

But etching is alloy specific. Only non-precious alloy which can be etched is used. Precious alloys cannot be etched. Micromechanical retention in noble alloys is achieved by electrolytic tin plating.

Other means of micromechanical etching are Sand blasting 50-250 u Aluminium oxide. Chemical etching can be achieved by Hydrofluoric Acid gel and Aqua Regia Gel.<sup>3</sup>

*Electrolytic etching:* The procedure can be outlined as follows: the polished bridge is mounted on an electrode (the electrode to the lingual of the retainers), electrical continuity is assured by use of a conductive paint at the contact point, and all areas not to be etched and the electrode are then masked with sticky wax. The electrode and bridge are mounted opposite a stainless steel electrode and immersed in an appropriate acid. The bridge is made anodic and current passed at a given density for a prescribed time. The etching acid, its concentration, the current density, and etching time must be carefully determined for a given alloy in order to get maximum resin to alloy bond strengths. Use of the wrong acid can result in electropolishing rather than etching. The conditions for etching a commonly used Ni-Cr alloy are: 10% sulfuric acid at a current density of 300

milliamperes per square centimeter of surface to be etched for a period of 3 minutes followed by cleaning with 18% hydrochloric acid in an ultrasonic bath for 15 minutes.<sup>3</sup>

*A stress-relieved resin bonded fixed partial denture:* A modification of the Maryland bridge is given by Sanford Plainfield, Vincent Wood and Ralph Podesta<sup>4</sup>, for stress relieving that has been proved effective in preventing debonding of the prosthesis during function. Their observation of failures of resin bonded bridges indicated that there was a problem often with the mobility of the abutment teeth during function and not due to the bonding of the prosthesis.

The design they proposed included the matrix (female) portion of stress reliever within the pontic section of the prosthesis. The matrix (male) was attached to the abutment section to be bonded to the abutment tooth. They came up with the term "The Golden Gate Bridge."<sup>4</sup>

*The Procera Maryland Bridge<sup>5</sup>:* The Procera Maryland Bridge represents a further evolution of Livaditis's initial concept. The one-piece zirconia framework incorporates an all-ceramic incisor

pontic connecting two wings that are bonded (or cemented) to the lingual of the adjacent teeth. Preparation is restricted to the lingual surfaces and the lingual aspect of the interproximal and is minimal, limited to 0.5 mm or less of the enamel layer. The framework is precision milled from a solid piece of zirconia. Zirconia cannot be acid-etched. To further increase the bond strength capability

of the wings, the Drake Precision Laboratory has developed a proprietary process for coating them with porcelain, etching the porcelain, and bonding the porcelain surface to the teeth with composite, veneer cement, or a composite-based luting system.<sup>5</sup>

*Carolina Bridge<sup>6</sup>:* Developed at university of North Carolina, it is also a tooth colored version of Maryland bridge. It is an all-porcelain bonded pontic that is used as an interim prosthesis. Uses little or no tooth preparation at all.

### Adhesive Bridge

As a result of extensive research chemically active adhesive cements were developed for direct bonding to metal. Developed in early 1990s, these cements rely on chemical adhesion to the metal and not on microretention in the surface of the metal for bond strength. Etching was no longer necessary. Adhesive bridge shows chemical bonding between the metal and the resin luting agent.

Metabond is first of these resin systems.<sup>1</sup> It is based on formulation of Methylmethacrylate (MMA) polymer powder and MMA liquid modified with adhesion promoter 4-META (4-methacryloxyethyl trimellitate anhydride). Unique tributyl borane catalyst is added to liquid. Superbond has highest initial bond strengths of any adhesive resin systems. But, it gives weak bond with high gold alloys. Introduction of Metabond was followed by Panavia which can be used both with high gold and base metal alloy.<sup>1</sup>

**Design and tooth preparation:** Based upon the work of Livaditis the elements of design that are essential for successful restorations have evolved. The following design elements should be included in any posterior bridge.<sup>3</sup>

**1. Path of insertion:** A distinct path of insertion must be created in an occlusogingival direction. This is accomplished by parallel modification of proximal and lingual surfaces

of the abutment teeth. The height of contour is lowered to within one millimeter of the gingival margin where possible, provided that such modification

will not penetrate the enamel. Thus in some proximal areas, due to the concavity created by the coronal narrowing in a gingival direction, the height of

contour may only be lowered sufficient to provide occlusogingival depth for the connector — generally a minimum of 2 mm.<sup>3</sup>

**2. Proximal resistance form:** The alloy framework must extend buccally beyond the distobuccal and mesiobuccal line angles of the respective

abutments. If esthetics are compromised by the buccal extent of the alloy, then judicious modification of the buccal enamel allows the proximal buccal line

angle to be moved lingually. The alloy only needs to extend just buccal to this line angle to establish the resistance form and is easily hidden with proper contour of the buccal porcelain.<sup>3</sup>

**3. Occlusal rest:** The rest should be small but well defined and not a broad

spoon shape similar to classic removable partial denture occlusal rests. Usually a number 5 or 6 round bur is employed and the rest created is 1-1.5 mm in the buccolingual direc-

tion, 1-1.5 mm in the mesiodistal direction and 1 mm deep. The location of the rest is not critical and can be placed any-

Replacement of single missing tooth
Young patients with large pulp chamber
Periodontally compromised teeth
Sound or minimally restored abutments
<b>Table-1: Indications for resin bonded bridges<sup>9,10</sup></b>

Long edentulous spans
Unfavourable occlusal scheme/ parafunctional habits
Heavily restored abutment teeth
Significant pontic width discrepancy
Abnormal quality and quantity of enamel
Nickel sensitivity
<b>Table-2: Contraindications for resin bonded bridges<sup>9,10</sup></b>

Reduced cost
Supragingival margins
Minimal tooth preparation
<b>Table-3: Advantages of resin bonded bridges<sup>10</sup></b>

Uncertain longevity
No space correction
No alignment correction
Difficult temporization
<b>Table-4: Disadvantages of resin bonded bridges<sup>10</sup></b>



Figure-1: Bonded pontic; Figure-2: Rochette bridge



Figure-3: Virginia bridge; Figure-4: Maryland Bridge

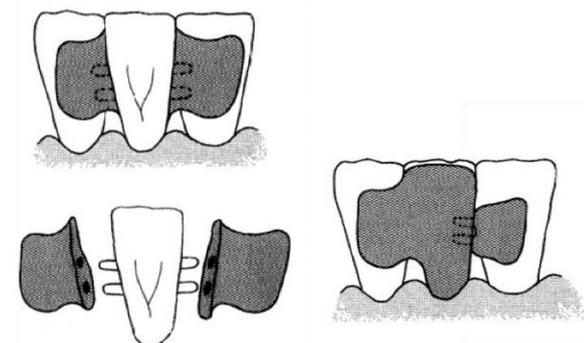


Figure-5: Three-piece "Golden Gate Bridge"

where along the marginal ridge to remove it from an area of occlusal contact. When a distinct Cusp of Carabelli is present, this can be modified to function as a rest.

**4. Margins of the preparation:** Enamel is removed gingivally only to the extent

that a knife-edge supragingival margin results. Thus the gingival contour of the restoration should duplicate the enamel removed during preparation.

These fine margins are aided by the 0.3 mm minimum thickness commonly employed for the lingual portion of the retainer.<sup>3</sup> There is no attempt made to create a chamfer margin at the gingival; this only removes enamel unnecessarily.

The other features of tooth preparation as described by Vimal Arora, M.C. Sharma, Ravi Dwivedi<sup>7</sup>; in their study Comparative evaluation of retentive properties of acid etched resin bonded fixed partial dentures include:



Figure-6: The Procera Maryland Bridge



Figure-7: Carolina bridge

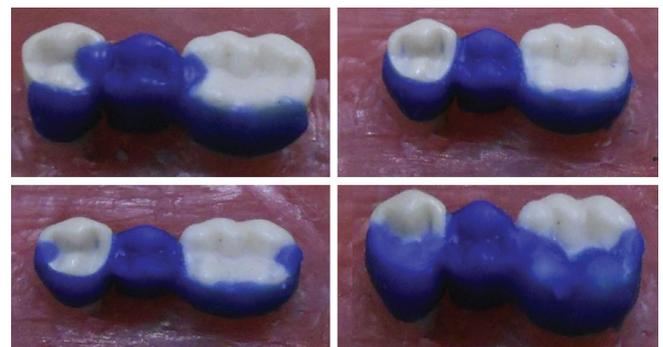


Figure-8: Standard tooth preparation with wings and occlusal rest; Tooth preparation with proximal slice; Tooth preparation with wings, proximal slice and grooves; Tooth preparation with wings, proximal slice, grooves and occlusal coverages



Figure-9: Mary – lever prosthesis

**Mary-lever Prosthesis or hybrid resin bonded prosthesis**

It was described by Venkat Aditya Sunki et al<sup>8</sup> in 2013, in this kind of prosthesis a combination of conventional fixed dental prosthesis and resin bonded prosthesis.

It is given in cases where the edentulous span is long where an ideal resin bonded prosthesis cannot be given.<sup>8</sup>

**SUMMARY**

The RBB requires less clinical time and, in most cases, is less demanding to fit than all other forms of tooth replacement. Failure is generally far less catastrophic than with conventional bridges or implant retained prostheses. RBBs can now be considered to be a minimally invasive, relatively reversible, aesthetic and predictable restoration for prescription in general dental practice.<sup>11</sup>

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# Analysis of Profile of Childhood Poisoning in A Tertiary Care Medical College Hospital

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## ABSTRACT

**Introduction:** Paediatric population is very vulnerable to acute unintentional poisoning. Poisoning is one of the most important causes of mortality and morbidity among children. Prevention plays a pivotal role in reducing its morbidity and mortality. This study was conducted to understand the profile of poisoning in children with special reference to the etiological agents causing it.

**Materials and methods:** Children hospitalized with acute poisoning at the paediatric intensive care unit (PICU) between January 1<sup>st</sup> 2010 and December 31<sup>st</sup> 2015 were retrospectively evaluated from hospital records. A detailed history was taken using the proforma having special reference to age, sex, poisoning agents and route of intake, time of admission of the poisoned patients, socio- economic status of the family.

**Results:** A total of 5806 patients were admitted in the PICU and 401(6.9%) were due to acute poisoning. 85% were under the age of six, with a peak age of 2-3 years (31.42%). Pharmaceutical medicine poisoning 128(31.9%) was the most common cause of unintentional poisoning in 91(22.7%) children followed by kerosene (hydrocarbon) poisoning in 88(21.9%) patients. 62 products were identified as various causes of poisoning. All the children were admitted to the PICU, but most only required supportive care. Specific antidotes were administered in 38 cases. Two children died during the study period.

**Conclusion:** All paediatric age groups are at risk of poisoning. Most children suffer due to unintentional poisoning because of easy availability of medications, hazardous liquids and house products. As poisoning is preventable it must be given due importance in health control programs at all levels of health care.

**Keywords:** Poisons, Acute child poisoning, Unintentional, Hydrocarbon (Kerosene, Petroleum), Drugs, Organophosphorus compounds

## INTRODUCTION

The exposure of child to an agent that, by transference of chemical or radiant energy, can cause symptoms and signs of organ dysfunction leading to injury or death is defined as acute child poisoning (ACP).<sup>1</sup> Paediatric population is very vulnerable to acute unintentional poisoning. ACP is also a health hazard in every country. Poisoning is a major problem all over the world, and the seriousness increases when a child is affected. Its spectrum and the associated morbidity and mortality varies in different countries. The quicker the initial resuscitations measures are administered, gastric decontamination and use of specific antidotes, the better the outcome in a case of ACP.

Literature review has revealed a lot of data about accidental

childhood poisoning from developed countries and many in the in the developing countries as well.<sup>2</sup> ACP is implicated in about 2% of all injury deaths in children in developed countries and about 5% in developing countries.<sup>2,3</sup> Boys are more likely to experience incidents of accidental poisoning than girls.<sup>3</sup> ACP in developed nations are having a decrease trend in the number of admissions due to accidental poisoning.<sup>2,4</sup> Prevention plays a pivotal role in reducing its morbidity and mortality. This study was conducted to understand the profile of poisoning in children with special reference to the etiological agents causing it.

## MATERIALS AND METHODS

The medical college receives patients from nearby four districts as Thrissur district is almost in the centre of Kerala state. Children hospitalized with acute poisoning at the PICU between January 1<sup>st</sup> 2010 and December 31<sup>st</sup> 2015 were retrospectively evaluated from hospital records. A thorough history was taken using the proforma having special reference to age, sex, poisoning agents and route of intake, time of admission of the poisoned patients after ingestion, socio-economic status of the family (according to the modified Kuppusswamy scale). In this retrospective study necessary investigations including complete hemogram, renal function tests, liver function tests, urine analysis, blood level of drugs, and chest x ray were done. Some children with multiorgan dysfunction required bleeding and coagulation profile evaluation, Blood gas analysis and imaging studies. As most of the patients were from the villages and towns near to the medical college none of them had any toxicological analysis report.

Inclusion criteria of the study took into consideration those with definite history of poisoning. snake bites, drug ingestion, corrosive intake, food poison, any comorbid conditions were included in the study. Also we included cases with suspicion of ACP along with unknown bite and drugs intake. All babies below 1 year age, developmentally delayed children, having associated diseases like chronic debilitating encephalopathies and neuropathies, neuro degenerative diseases

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were excluded. Profile of paediatric population with ACP, their symptoms, type of ACP and outcome after treatment were analyzed. The study design was approved by Institutional Ethics Research Committee.

**RESULTS**

A total number of 5806 patients were admitted in the PICU during the study period and 401(6.9%) admissions were due to acute poisoning. Male children were 65.8% and females 34.2% (Figure 1). Majority, 126(31.2%) of these were between 2 to 3 years of age, 18(4.5%) less than 1 year, 109(27.1%) 1-2 years, 52(12.9%) 4-5 years, while 32(5.2%) were of more than 10 years of age. (Table 1). 85% were under the age of six, with a peak age of 2-3 years (31.2%).

As regard with the etiological agents involved, sixty two products were identified as various causes of ACP. ACP due to drugs and medicines poisoning was noted in 128(28.7%) patients. This was followed by kerosene (hydrocarbons) in 91(22.7%) cases. The poisons identified in the PICU in

the study are mentioned in Table 2. They include drugs and medications 128(28.7), hydrocarbon (including kerosene) 118(29.4%), insecticides and pesticides 43(10.7%), corrosives (acids and alkali) 24(5.9%), plant poisoning 13 (3.2%), organophosphorous 12(2.9%), snake bite 11(2.7%), unknown bite 8(1.9 %), Bee sting 6(1.4%), food poisoning 5(1.2%), scorpion sting 5(1.2%), dyes 3(0.7%), alcohol ingestion 2(20.4%) and miscellaneous 23(5.7%). The various drugs and medicinal preparations included anti psychotics (19%), acetaminophen (15%), cardiovascular drugs (12%), unknown drugs (9%), benzodiazepines (7%), hormones (thyroxine tablets) (7%), anticonvulsants (6%), antihistamines (4.5%), antibiotics (3.5%), salbutamol (3%), Dapsone (3%), oral hypoglycaemic agents (3%), vitamins (2.5%), non-steroid anti-inflammatory drugs (2%) (NSAIDS), wound cleaning agents such as povidone iodine (1.5%) and antiemetics (1%). (Figure 2).

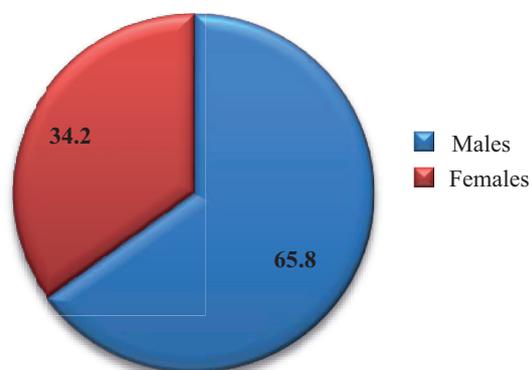
All the patients were admitted to the PICU, but most only required supportive care. According to the social status majority belonged to lower socio-economic status 305(76.2%) and were from the villages and rural areas. Majority of the ACP presented within 6 hours of the exposure 290(73%) and there was even delay in one child of about 14 hours and he expired of acute dichromate poisoning.<sup>19</sup> More than 90% of the ACP had vomiting and nausea as the initial symptom after exposure. Specific antidotes were administered in 38 cases. Among these 401 ACPs only 2 children expired and children with severe ACP were regularly followed in the out-patient clinic.

Age in years	Total and %
Less than 1 year	18
1 to 2 years	109
2 to 3 years	126
3 to 4 years	52
4 to 5 years	29
5 to 6 years	8
6 to 7 years	6
7 to 8 years	9
8 to 9 years	8
9 to 10 years	4
10 to 11 years	5
11 to 12 years	6
12 to 13 years	7
13 to 14 years	7
14 to 15 years	3
Total cases 401	

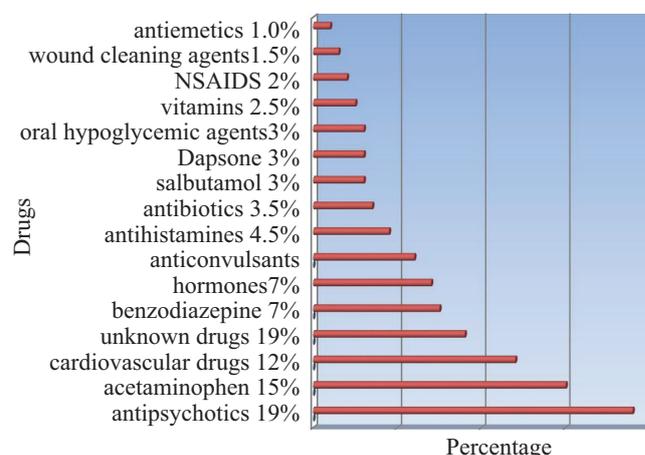
**Table-1:** Distribution of age

S. No	Types of poisoning	Number of cases (%)
1.	Drugs and medications	128 (28.7)
2.	Hydrocarbon (including Kerosene)	118(29.4)
3.	Insecticide and pesticides	43(10.7)
4.	Corrosives(acids and alkali)	24 (5.9)
5.	Miscellaneous	23 (5.7)
6.	Plant poisoning	13 (3.2)
7.	organophosphorous	12(2.9 )
8.	Snake bite	11(2.7)
9.	Unknown bite	8(1.9 )
10.	Bee sting	6 (1.4)
11.	Food poisoning	5 (1.2)
12.	Scorpion sting	5(1.2 )
13.	dyes	3(0.7 )
14.	Alcohol ingestion	2(20.4)
	Total	401

**Table2:** Types of poison agents



**Figure-1:** Gender distribution



**Figure-2:** Drugs in poisoning and percentage

## DISCUSSION

Acute poisoning and exposure to chemicals is a major problem around the world and ACP is an alarming health issue to any health care facility. Poisoning is the fourth leading cause of mortality and morbidity following road traffic accident, burns and drowning.<sup>2</sup> Children are very vulnerable and the paediatric population below the age of five years constitute about 15% of unintentional poisoning related deaths.<sup>3,4</sup> This is substantially due to an increasingly rapid rate of industrialization with an increase in the number and types of chemicals available world wide.<sup>5</sup>

Pertaining data and studies revealed that children under five years of age are particularly at risk from accidental ACP.<sup>6</sup> In our study 85% of ACP were under the age of six, with a peak age of 2-3 years (31.42%). This is in similarity to the mean age of 2.73 years in other national study.<sup>7</sup> The children are inquisitive and often are poisoned accidentally when they ingest them orally. Male children were 65.8% and females 34.2% in our study and is in accordance with many studies.<sup>8</sup> Lin YR, Liu TH et al<sup>9</sup> and Yang CC, Wu JF et al<sup>10</sup> also demonstrated the male predominance.

According to the social status majority belonged to lower socio-economic status 305(76.2%) and were from the villages and rural areas with a similar data of 72.3% has been reported from a referral center in India.<sup>11</sup> Children in urban areas are more vulnerable as they are exposed more to the poisonous agents like household products such as mosquito repellents, bleaching powders and drugs and medicinal preparations such as mouth wash and antiseptic lotions such as povidone iodine. There is also lack of immediate conveyance in some rural areas to reach the hospital in time.

ACP due to drugs and medicines poisoning was noted in 128(28.7%) patients. This was followed by kerosene (hydrocarbons) in 91(22.7%) cases. Pharmaceuticals drugs and medicinal preparations were the most common cause of poisoning in our study with psychotropic agents (19%) and acetaminophen (15%) being common. Other studies also have noticed the drugs as a leading cause of ACP.<sup>9,10,12</sup>

Kerosene oil was the second commonest agent involved as a cause of ACP in our study. It has been reported as the commonest substance involved in accidental childhood poisoning in India as well.<sup>13</sup> Also other studies from the developing countries in Asia (India, Malaysia) and Africa (Nigeria) have mentioned the prevalence of this hydrocarbon ingestion.<sup>14-17</sup> Kerosene oil is used as a fuel for cooking and other purposes in most of the developing countries. It is sold sometimes openly and parents store them in medicine bottles, household containers or soft drink bottles. Children have an easy access in the kitchen and unintentionally consume them. This can result in severe aspiration pneumonias and some time the child can become very sick. So the various poisons identified in the PICU in the study are similarly seen in other studies as well.<sup>2-4,6-8,9-18</sup> They include drugs and medications 128(28.7), hydrocarbon (including kerosene) 118(29.4%), insecticides and pesticides 43(10.7%), corrosives (acids and alkali) 24(5.9%), plant poisoning 13(3.2%), organophosphorous 12(2.9%), snake bite 11(2.7%), unknown bite 8(1.9%),

Bee sting 6(1.4%), food poisoning 5(1.2%), scorpion sting 5(1.2%), dyes 3(0.7%), alcohol ingestion 2(20.4%) and miscellaneous 23(5.7%).

Unknown drugs (9%) have been mentioned in our study as in other study.<sup>12</sup> Miscellaneous are such as cockroach repellent sticks, pencils, detergents, and soap solutions used in households. ACP occurs when substances are ingested, inhaled, injected or absorbed through the skin in quantities that are harmful to the body.<sup>1,21</sup> More than 90% of the ACP had vomiting and nausea as the initial symptom after exposure. The other initial symptoms and clinical findings were such as increased drowsiness, breathing difficulty, burns, ataxia, myosis, bradycardia, haematemesis and are varied depending on the particular poisoning.<sup>1-4,18,19</sup>

Ingestion was the most common route (93% of cases). Similar results (96.8%) have been reported in other studies.<sup>12,14-18</sup> Paudyal et al<sup>17</sup> highlighted the incidence of unintentional poisoning 98.4% in children as is the same in our study. Only 2 children above 13 years had intentionally consumed poison in our study. And is in accordance with other studies showing unintentional ACP as the major type of ACP.<sup>8,9,15-18</sup>

The various drugs and medicinal preparations included anti psychotics (19%), acetaminophen (15%), cardiovascular drugs (12%), unknown drugs (9%), benzodiazepines (7%), hormones (thyroxine tablets) (7%), anticonvulsants (6%), antihistamines (4.5%), antibiotics (3.5%), salbutamol (3%), Dapsone (3%), oral hypoglycaemic agents (3%), vitamins (2.5%), non-steroid anti-inflammatory drugs (2%) (NSAIDS), wound cleaning agents such as povidone iodine (1.5%) and antiemetics (1%). It is advisable for the family to keep these drugs away from children. Many families make the child give the medicine in the grand parents and parents mouth. This is a serious problem as there is a chance for the youngster to ingest it and be poisoned. Among these 401 ACPs only 2 children expired. Majority of the ACP presented within 6 hours of the exposure 290 (73%) and there was even delay in one child of more than 14 hours and he expired of acute dichromate poisoning.<sup>19</sup> Sunilkumar MN, Ajith TA, et al<sup>19</sup> discussed the case of a 2 year old child during the study period who accidentally ingested ammonium dichromate crystals in his house. This child was from a rural area and presented to the hospital only after about 14 hours of ingestion and in spite of all resuscitatory measures expired. The second child was a 4 year old who expired of unknown bite (probably snake bite). Sunilkumar MN, Ajith TA, et al<sup>20</sup> also highlighted a case of acute Dapsone poisoning in a 3 year old child, admitted in the same medical college and the recent advances in its treatment. So it is a challenge for the paediatrician to treat such cases of ACP. Specific antidotes were administered in 38 cases.

Special attention should be paid to the high incidence of poisoning in children all over the world and psychology counselling given to the children who are intentionally causing ACP. The medical teaching schedule should give undue importance to the field of Clinical toxicology so that these ACPs issues can be treated timely and successfully with the knowledge acquired.<sup>21</sup>

## CONCLUSION

Accidental childhood poisoning is a major public health problem. The awareness of the various poisonings could reduce the mortality rate as potential antidotes could be administered early. Pharmaceutical drugs and medicines, kerosene, and household chemicals are the main substances responsible for ACP as these substances are not stored properly. Parental education is the hall mark in prevention of ACP at home.

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# Effect of Phenylephrine, Ephedrine and Phenylephrine Plus Ephedrine Infusions on Maternal Hypotension in Elective Caesarean Section: A Comparative Study

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## ABSTRACT

**Introduction:** Spinal anaesthesia especially with phenylephrine and ephedrine is considered the standard anaesthetic technique for elective caesarean section due to its rapid onset, intensity, symmetric sensory and motor block. We have tried to compare the efficacy of phenylephrine and ephedrine alone and in combination to monitor maternal hypotension in elective caesarian section.

**Materials and Methods:** 150 pregnant women of 36 weeks and above undergoing elective caesarian sections were categorised into 3 groups of 50 each. Patients in Group I were to receive phenylephrine (100mcg/ml), Group II ephedrine (3 mg/ml) and Group III both phenylephrine (50mcg/ml) and ephedrine (1.5 mg/ml).

**Results:** Age, weight, height and weeks of gestation were comparable in all the cases. Patients in Group I showed the least incidence of hypotension and had steady systolic pressure, while Group II had highest incidence of hypotension. Nausea and tachycardia also was seen highest in Group II.

**Conclusion:** Our study showed that phenylephrine was a better vasopressor than ephedrine or the combination of the two drugs for maintaining maternal hypotension during caesarian section.

**Keywords:** Phenylephrine, Ephedrine, Vasopressor, Caesarian section, Hypotension

## INTRODUCTION

Pregnancy is considered as one of the most common physiological conditions of women. Of all the deliveries conducted, about 10% of them end up as caesarian sections due to high risk conditions. This incidence is steadily rising especially in the developed world<sup>1</sup> resulting in caesarian section being one of the most commonly performed operations. This could be due to factors such as factors such as widespread use of fetal monitoring, high private insurance rates, restrictive insurance policies, advancing maternal age and high medical malpractice costs<sup>2,3</sup> In India, data collected from 30 medical colleges/ teaching hospital revealed that caesarean section rates increased from 21.8% in 1988-89 to 25.4% in 1993-94.<sup>5,2</sup> A population based cross-sectional study conducted in India, a caesarean section of 32.6% has been documented from Madras City in South India.<sup>2</sup>

Regional anesthesia in Cesarean section offers significant benefit over general anesthesia. Spinal anaesthesia (SA) has gained popularity a few years ago over epidural anesthesia and is nowadays considered the standard anaesthetic technique for elective caesarean section due to its rapid onset,

intensity, symmetric sensory and motor block.<sup>4</sup> But, the occurrence of hypotension due to spinal anesthesia is one of the consequences. Without prophylactic measures, the incidence of hypotension is known to be 80%.<sup>6,7</sup> Hypotension whether accompanied by bradycardia or not, is detrimental to the foetus. Although the incidence of hypotension can be lowered by several ways, no single method is known to completely prevent it.<sup>8,9</sup> Though preloading and left uterine displacement are very useful in treating hypotension, vasopressors have been shown to be more effective.

Epidural anesthesia provides the opportunity to extend surgical anesthesia to post-surgical analgesia via catheter and control of the level of anesthesia. Combined spinal-epidural anesthesia offers the benefit of both epidural and spinal techniques with less medication, better reliability and less incidence of hypotension.<sup>4</sup>

Systolic hypotension higher than 20% to 30% of patient's baseline blood pressure can lead to maternal low perfusion pressure, manifested as nausea-vomiting, dizziness, low conscious and utero-placental hypo perfusion with fetal hypoxia and acidosis. Therefore, prevention and treatment of this complication, with special medical agents for optimal keeping of mother's blood pressure and fetal circulation has been an important issue for both anesthesiologists and obstetricians

## MATERIALS AND METHODS

This randomized clinical trial was done at IMSR Medical College between Feb 2013 and Jan 2015 on 150 pregnant women undergoing elective caesarian. This study was conducted after obtaining ethical committee clearance from the institution and informed consent from the patients. All the patients in the ASA Grade 1 or 2, were included in the study when they were in over 36 weeks of pregnancy. Physical tests were carried out on all patients. Patients who had hypertension, diabetes, cardiac and renal disease, pregnancy induced hypertension were excluded from the study. Signs

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Details	Group I (with phenylephrine)	Group II (with ephedrine)	Group III (with combination)	P value
Age	25.4 ± 3.2	25.7 ± 4.1	24.9 ± 3.9	0.42
Weight	58.1 ± 4.2	59.2 ± 3.6	58.6 ± 5.1	0.44
Height	154 ± 6.1	153 ± 5.2	154 ± 5.7	0.23
Gestation	38.2 ± 1.1	38.4 ± 0.6	38.1 ± 0.9	0.39

**Table-1:** Demographic details of the patient

Group	No of cases	% in Group	% overall
Group I	2	4%	1.3%
Group II	14	28%	9.3%
Group III	8	16%	5.3%

**Table-2:** Incidence of maternal hypotension

and symptoms of antepartum hemorrhage by placenta previa and abruption placenta were also excluded from the study.

All the 150 women were randomly categorized into 3 groups of 50 each. Patients in Group I were to receive phenylephrine (100mcg/ml), Group II ephedrine (3 mg/ml) and Group III both phenylephrine (50mcg/ml) and ephedrine (1.5 mg/ml). One day before surgery, hemodynamic levels were noted and the patients were advised a minimum of 6 hour fast.

On the day of surgery, Non invasive blood pressure, Heart rate and oxygen saturation were recorded before anaesthesia was given for all patients. They were monitored using SpO<sub>2</sub>, non-invasive blood pressure (NIBP), electrocardiogram (ECG). Intravenous preloading was done with 15 ml/kg lactated Ringer's solution over 15 min. The patient was positioned in the right lateral position with thigh and legs, hip and knees and flexion at the head. The spinal anesthesia was given at L3, L4 or L5 interspace. After the SA, the patients received IV lactated Ringer's solution at the rate of 5 ml/min till umbilical cord clamping. Patients were turned to supine position with a wedge under the right buttock.

Blood pressure, Heart rate and oxygen saturation, respiratory rate, was monitored every 2 mins for the first 15 minutes, every 5 mins for the next 15 minutes and every 15 minutes thereon till the end of surgery. Hypotension i.e. Systolic Blood pressure less than 80% the base line was treated with 6mg ephedrine given intravenously and repeated if need occurs Bradycardia i.e if the heart rate of the mother is less than 50 per minute id treated with 0.6mg IV atropine especially if associated with hypotension. If clinically tolerable, the infusion was temporarily stopped.

The time of vasopressor administration, baby extraction, and duration of surgery were noted. After birth, the neonatal monitoring was performed by the neonatologist based on the Apgar score.

## RESULTS

The demographic details for all the patients in the three groups were similar with reference to age or weight (table 1). All patients were given vasopressor therapy for hypotension. Of the 150 patients, caesarians were performed due to repeat caesarian in 89(59.3%) cases, due to complications in pregnancy ( breech condition of fetus, cephalopelvic disproportion and other anomalies) in 43 cases (28.7%) and patient's request in 18 cases (12%).

The vital signs which were monitored throughout the surgery were systolic Blood pressure, Diastolic blood pressure, saturated oxygen levels and heart rate and additional vasopressor therapy details were also monitored. Diastolic blood pressure was recorded at the same times as the systolic blood pressure and was very similar to the same. Heart rate and saturated oxygen levels also were regularly monitored and were in the normal limits. Therefore, both these readings did not show any significant change from the normal levels.

The systolic blood pressure in all the three groups were in the normal levels at the start of the surgery. After 10 minute of surgery, the SBP decreased to almost 92 in Group II while it remained steady in Group I. Slight lowering of the SBP was seen in Group III. After a bolus of vasopressor, the SBP was brought to normal levels within 15 minutes of surgery (Fig:1).

Hypotension was seen in 29 (19.3%) of the cases overall. The incidence was 3(6%) in Group I, 16 (32%) in Group II and 10 (20%) in Group III. The incidence of hypotension in overall patients was 2%, 10.7% and 6.7% respectively. Several episodes of hypotension was observed during the surgery (Table: 2).

Among the complication, hypertension was observed in all the groups but there was a predominance in Group II. Although this was not found to be significant. Neither were bradycardia and nausea whose incidence also was marginally varying in all the 3 groups (Fig: 2). Tachycardia was very high in Group II where Ephedrine was given as vasopressor, while they were significantly lower in the other groups.

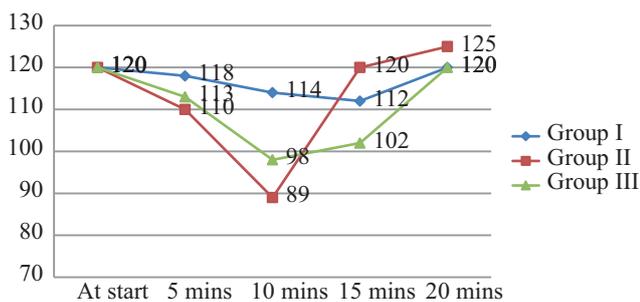
The Apgar score was comparable in all the three groups.

## DISCUSSION

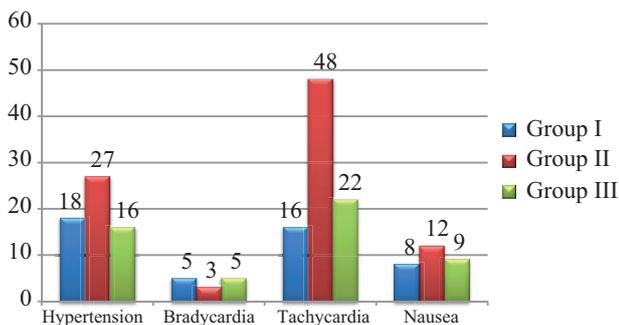
Availability of fine-gauge pencil-point needles, painless anesthetic conditions, with addition of spinal opioids to hyperbaric bupivacaine has made spinal anesthesia a preferred method for caesarian deliveries.<sup>4</sup> However, the major drawback with this technique is maternal hypotension.

After subarachnoid block for caesarean section, the use of IV fluid preload, avoidance of aortocaval compression and judicious use of vasopressor agent can reduce the incidence of hypotension. It has been shown that the percentage decrease in placental perfusion is related to the percentage reduction in maternal arterial pressure.<sup>10,11</sup>

Our study showed the efficacy of Phenylephrine as a better vasopressor agent for controlling hypotension in caesarian sections in mothers undergoing spinal anesthesia compared to ephedrine and to the combination of Phenylephrine and ephedrine. It was also observed that the combination of the two was better than ephedrine alone but not as good as phenylephrine alone. The same was also observed by other



**Figure-1:** Mean levels of systolic blood pressure



**Figure-2:** Complications in patients in the three groups

researchers in similar studies. Das et al observed similar results in a randomized double blind study<sup>12</sup> and Saravanan et al found phenylephrine to be a more potent drug compared to ephedrine.<sup>6</sup>

However no difference between the two types of vasopressors in managing maternal hypotension was observed by Atashkhoyi Simin et al<sup>13</sup> Kee et al also found both these vasopressors to be equally effective.<sup>15</sup> In yet another study by Aziz et al, phenylephrine was found to be less efficient than ephedrine.<sup>14</sup>

Normally, it is not uncommon to have a few patients having nausea even though they have a stable SBP. We had an incidence of 29 cases of nausea with 12 of them being in Group II, 9 in Group III and 8 in Group I. Our study showed a high incidence of hypertension in Group II but it was not significantly different in the other two groups. Bradycardia was similar in all the three groups but there was a significantly higher tachycardia in Group II. Although lesser but high incidence of tachycardia was seen in Group III as compared to Group I. Kee et al found an increasing trend in tachycardia in patients administered ephedrine rather than in patients with phenylephrine.<sup>15</sup> Same was observed by Das et al in yet another study.<sup>12</sup> However Aziz et al reported that nausea and vomiting were more predominant with phenylephrine than ephedrine.<sup>14</sup> Although phenylephrine is very efficient for managing maternal hypotension, it causes reflex bradycardia and may reduce cardiac output.<sup>8,18,19</sup>

## CONCLUSION

Infusion of phenylephrine alone as spinal anaesthesia was associated with a lower incidence of not only hypotension but also other complications like nausea, tachycardia, vomiting etc. In fetuses, it was associated with lower incidence

of fetal acidosis.

Therefore, we conclude that phenylephrine is a better vasopressor than ephedrine or the combination of the two drugs for maintaining maternal hypotension during caesarian section.

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# Osteosarcomatous De-differentiation of Low Grade Chondrosarcoma of Mandible –A Clinical Rarity

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## ABSTRACT

**Introduction:** Chondrosarcoma is a malignant cartilaginous tumour arising de novo in a bone or superimposed upon a pre-existing benign cartilaginous neoplasm. It makes up 10% of malignant tumours of jaws.

**Case report:** A case of de-differentiated chondrosarcoma of the anterior region of the mandible is presented, which was initially low grade variant and on recurrence it was turned to be a high grade variant of osteosarcomatous type with metastasis to lungs, along with a review of its prognostic factors.

**Conclusion:** When occurring in the head and neck, it arises most frequently in the maxilla, less common sites of involvement are the mandibular body, symphysis, coronoid process and condylar processes. Recurrent tumour always forecasts a bad prognosis.

**Keywords:** De-differentiated Chondrosarcoma, mandible, metastasis, prognostic factors

## INTRODUCTION

Chondrosarcoma (CS) is a malignant tumour whose cells produce a pure hyaline cartilage that results in an abnormal bone and/or cartilage growth. It comprises about 10% of all primary tumours of skeleton but the involvement of jaw is very rare. Approximately 1-3% of all CS arise in the head and neck area and such lesions comprise only 0.1% of all head and neck malignancies.<sup>1</sup> Among the different histologic variants, Dedifferentiated chondrosarcoma (DDCS) is a rare and rapidly expansile bone tumour reported in oral and maxillofacial region. It constitutes 1%-2% of all primary bone tumours.<sup>2</sup> This article describes a rare case of De-differentiated chondrosarcoma of osteosarcomatous type arising from incompletely resected low grade chondrosarcoma of the anterior mandibular region with metastasis to lung. This is the second most case reported in the oral and maxillofacial region. The clinical, radiographic, surgical and pathological aspects of this lesion are presented and the prognostic factors are reviewed.

## CASE REPORT

An 18 year old female reported with a complaint of swelling in relation to left lower anterior region of the jaw since 3 months. She also gave a history of swelling in the anterior region of the mandible, which was noticed 3 months back. It was of almond size initially and attained to the present size. It was associated with numbness in the same region. Patient underwent incomplete mandible resection for a similar swelling in the jaw 1.5 years back and post operative course

was uneventful and her histopathological report was documented as low grade chondrosarcoma. The history of similar complaint was reported for her grandmother in the family. Local examination revealed a diffuse swelling on the left lower third of the face across the midline of size 12.5cm x 11 cm. Antero-posteriorly it extended from the right symphysis region upto the left angle of mandible and superior-inferiorly at the level of corner of mouth to upper one third of left cervical region. Skin overlying was tensed, erythematous and also with ulcerations (Figure 1). Two jugulodigastric lymph nodes on the left side measuring approximately 1.5cm x 1.8cm was palpable, tender, hard and fixed to underlying tender, hard in consistency, with local rise in temperature and fixity to underlying tissues on palpation.

Intraoral examination revealed a diffuse swelling with ill defined margin measuring approximately 3.2 cm x 2.8 cm extending from 43 to 37 obliterating the mucobuccal fold and also extended to floor of mouth. On palpation, inspeatory findings were confirmed; swelling was stony hard in consistency and was tender. Routine examination revealed mobility in relation to 43 and 37 and missing teeth in relation to 41, 42, 31, 32, 33, 34, 35, 36. Orthopantomograph showed missing tooth along with loss of cortical bone with respect to 42, 41, 31, 32, 33, 34, 35 and 36 and widening of periodontal ligament space with respect to 43 and 37. It also showed metallic prosthesis at the inferior border of mandible extending from 46 to 38 (Figure 2). Axial computerized tomography revealed Sun burst pattern within the ill defined heterogeneous mass (Figure 3). Incisional biopsy of the tumour was advised and specimen was sent for histopathological examination. Microscopic examination of Haematoxylin and Eosin stained sections revealed Chondroid areas along with few osseous areas in which chondroblasts are present of varying size. Most of the cells are pleomorphic and binucleated with nuclear atypia. Cellularity is so dense at the periphery of lesion with spindle cell differentiation. Osteoid is distributed homogeneously in irregular manner in few areas suggestive of De-differentiated Chondrosarcoma of additional osteosar-

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comatous component (Figure 4). Following the report of dedifferentiated chondrosarcoma, the Patient was scheduled for chemotherapy first and excision of lesion under general anesthesia later. However, when the patient returned for initiation of chemotherapy, the swelling had increased in size to about 17 cm by 15.5 cm. The mucosa overlying the swelling was granular and pus discharge was present. The Patient succumbed to death during her first visit for chemotherapy due to metastasis to lungs.

## DISCUSSION

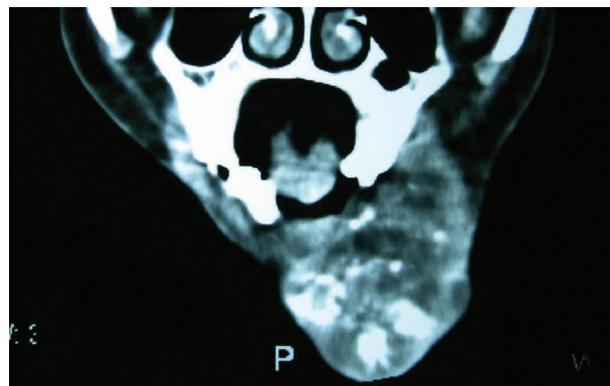
In 1971, Dahlin and Beabout first introduced the term Dedifferentiated chondrosarcoma. It constitutes 6 -10% of all chondrosarcomas (CS). It more often involves the extremities, especially the proximal femur, the pelvic bone and the humerus. Usually de-differentiation occurs in low grade chondrosarcoma. Nowadays it is noted that de-differentiation can occur in high grade chondrosarcoma and in benign chondromata. The prognosis of this tumour is remarkably poor, with a reported survival of less than six months and survival at five years of 10.5% - 13%, 7 with most patients living for less than two years.<sup>2</sup> Dedifferentiated chondrosarcoma (DDCS) consist of two distinguishable elements: low-grade chondrosarcoma elements and high-grade dedifferentiated elements. The dedifferentiated elements composed of osteosarcomas, angiosarcomas, fibrosarcomas, rhabdomyosarcomas, leiomyosarcomas, and giant cell tumours feature. Frassica et al found that patients with osteosarcomatous dedifferentiation had the worst prognosis.<sup>3</sup> Capanna et al noted that 44% recurrence occurred in low grade chondrosarcomatous component cases and 72% in high grade component cases. Mercuri et al recognised 33% relapses in cases with Malignant fibrous histiocytomas component and 30% relapses when the undifferentiated part was an osteosarcoma.<sup>4</sup> According to Aigner et al report, DDCS is usually found in adults between 5<sup>th</sup> and 6<sup>th</sup> decade of life, with a mean of 54.6 years and ranging from 2<sup>nd</sup> to the 8<sup>th</sup> decade. The gender distribution is nearly equal. Most common signs are pain, swelling, palpable tumour masses and even pathological fractures, all manifests within a short span of time. Relatively high pathological fractures, ranging from 13 to 44.4% can be seen in this malignant tumour. The mass is usually rapidly growing and can ulcerate mucosa at later stages. The mechanism involved in the formation of this malignant tumour is trans-differentiation which was analysed by Aigner et al in 1998. It is also formed as a result of genetic alterations, loss of heterozygosity in both components of the tumour.<sup>4</sup> The characteristic feature of this malignancy is that, when it transforms from low grade lesion to a high grade malignant lesion, the dedifferentiated component will increase rapidly in size, causing distant metastatic disease and subsequent death in a relatively short time. This statement is in concurrent with our case. Patient died of lung metastasis within one week after biopsy.<sup>5</sup> Chondrosarcoma shows two quite different radiographic images: Frank radiolucency usually in an early stage or a radiolucency containing various shapes and sizes of radiopaque shadows. These radiopaque shadows are the result of calcifications or ossifications in areas of cartilage formation and are a feature of relatively long standing tumours; these



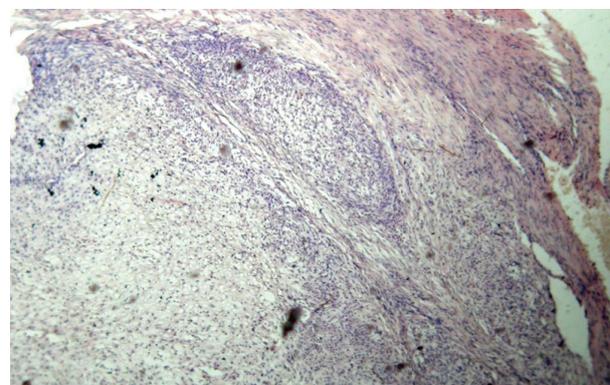
**Figure-1:** A diffuse swelling seen extraorally wrt anterior and left posterior body of mandible.



**Figure-2:** Orthopantomograph showed missing tooth along with loss of cortical bone wrt 42,41,31,32,33,34,35,36, widening of periodontal ligament space with respect to 43 and 37 and metallic prosthesis at the inferior border of mandible extending from 46 to 38.



**Figure-3:** Axial computerized tomography revealed Sun burst pattern within the ill defined heterogenous mass.



**Figure-4:** Chondromyxoid background with few osseous areas in which chondroblasts showed variation in size, binucleated cells with nuclear atypia and osteoid was seen in few areas in an irregular pattern (10x)

are found in the older parts of the tumour. The usual radiograph of a chondrosarcoma is that of an irregularly shaped, poorly defined radiolucency with randomly scattered, patchy opaque mottling. This indicates a probably malignant lesion. In case of dedifferentiation large areas of osseous destruction without reactive changes in association with large unmineralised soft tissue mass is seen in radiographs. In the 57 cases of DDCS reported, calcification was found in around 50% of the lesions and an extra osseous mass was observed in roughly 55% of tumours.<sup>6</sup> In low grade chondrosarcoma, the lesion is round, ovoid or lobulated. Generally the borders are well defined and at times are corticated. In DDCS, the peripheries are ill defined, infiltrative, invasive, with non corticated borders. The internal structure usually exhibit some form of calcification within the centre giving them a mixed radiolucent - radiopaque appearance. The central radiopaque structure has been described with flocculent, imploring snow like features. The reported patient's CT scan showed same features.<sup>7</sup> Tendency for metastasis disclosed in higher grades of CS and in sinonasal lesions. The rates of metastasis were 0% for grade 1, 10% for grade 2 and 71% for grade 3. Grade 3 chondrosarcoma often kills by metastasis, even if the complete treatment has been done. In our case too patient died due to lung metastasis.<sup>8</sup> The 5 year survival rates for grade 1, grade 2 and grade 3 were 90%, 81% and 43%. The 10 year survival rate were 83%, 64% and 29% respectively. The most important prognosis factor is resectability, which makes complete excision of the tumour the most single significant factor in the prognosis. The prognostic factors for grade 1, grade 2 and grade 3 were 80-90%, 50-80% and 0-43% respectively. The rate of recurrence were 40% for grade 1, 60% for grade 2 and 47% for grade 3. The rate of uncontrolled recurrence 27% for grade 1, 35% for grade 2 and 35% for grade 3.<sup>8</sup> Mercuri et al stated that 70 -82% of metastases occurred in lungs followed by 20% in viscera and 10% in skeleton. The other less common sites of metastases to occur are skin, adrenal glands, heart, intestines and brain. The average time from diagnosis to the onset of metastatic disease was 9 weeks. CS, particularly DDCS, is known to be resistant to the chemotherapy and radiotherapy. Thus, surgery remains the only potentially curative treatment for DDCS. The optimal treatment is always surgical treatment, with resection of the tumour within wide or radical margins. The rate of recurrence after wide or radical resection found a rate of 18.5% in contrast to 67% after inadequate resection according to Capanna et al. The longest interval between primary resection of a chondrosarcoma and occurrence of dedifferentiation was reported by Kumta et al. to be 20 years.<sup>9</sup> Mitchell et al stated that younger patients survive longer than older patients. The younger group had a 2-year survival rate of 56% and 28% after 5 years. Frassica et al noted that the five year survival rates of the patients treated with surgery alone and those treated with adjuvant chemotherapy were 11.8% and 4%, and the median survival time was 6.4 months and 8.4 months, respectively. The most common cause of death in chondrosarcoma is recurrence, not metastasis. Local recurrence, however, is more common than distant metastasis. Recurrent tumour forecasts bad prognosis. The reported patient

was suffering from recurrence and died within few weeks. Some recurrent chondrosarcomas in our series showed rapid and aggressive growth. Treatment was extremely difficult in cases of recurrent tumour.<sup>10</sup> The swelling of reported patient underwent rapid growth about an increase of 4.5cm in height and width after incisional biopsy. Therefore our patient was sent for chemotherapy before doing surgery. In these cases, death resulted from the direct extension of the tumour into vital structure.

## CONCLUSION

To conclude, even benign lesions following recurrence, are often found to be more cellular or to have already turned frankly malignant. Hence, all cartilaginous tumours of the jaws, benign or malignant, should be radically excised with a portion of the normal tissue to avoid recurrence.

## ACKNOWLEDGEMENT

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# Infertility with Special Reference to Genital Mycoplasmas in a Medical College and Hospital Kolkata

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## ABSTRACT

**Introduction:** In humans, infertility may describe a woman who is unable to conceive as well as being unable to carry a pregnancy to full term. Mycoplasma and Ureaplasma are the micro-organisms of sexually transmitted diseases. Several epidemiological reports have documented the presence of *M. hominis*, *M. genitalium* and *U. Urealyticum* in infertile women. Also in vitro studies have shown that sperm samples infected with these Mycoplasmas undergo detrimental changes in sperm count, sperm velocity and motility parameters.

**Material and methods:** The study was conducted on 100 women, divided into two groups: 60 cases with unexplained infertility (study group) and 40 cases with confirmed fertility (control group). Three cervical swabs were collected from each case and sent for bacteriological examination for mycoplasmas. Culture for genital mycoplasmas. Specimens were inoculated onto A7agar(Becton Dickinson). Bacterial DNA from 100microlitre of specimen or transport media was isolated. Multiplex PCR was performed with primers specific for highly conserved regions in the urease gene of Urea plasma spp, the 140-kDa adhesion protein gene of *M. genitalium*, and the 16S rRNA gene of *M. Hominis*. 50microlitre reactions containing a 0.2 mM concentration of de-oxynucleoside triphosphate mixture, 10mM Tris, 3mM MgCl<sub>2</sub>, 25pmol of each unlabeled forward primers, and 25pmol of biotin-labeled reverse primer (Table1) and 1.25U of GoldTaq (Applied Biosystems.). All reactions were performed in a Thermocycler.

**Results:** Mycoplasmas were isolated from 14 cases (28%) in study group and two cases (4%) in the control group. Out of these, 6 cases and 1 case in the study and control group respectively were positive for *U. urealyticum*.

**Conclusion:** Many types of genital infectious diseases (such as cervicitis, pelvis inflammatory disease) are caused by *M. hominis* and *U. urealyticum*, for infertility, but their actual role in obstetrical pathologies (premature delivery, premature rupture of membranes, chorio-amnionitis) and neonatal infections has not been proven. Doubts about their role still exist whether these mycoplasmas are pathogens or mere co-factors associated with genital infections and more studies need to be done to confirm their role.

**Keywords:** Genital Mycoplasmas

and the complications caused by these bacteria may lead to infertility in women.<sup>2</sup> Mycoplasma and Ureaplasma are the microorganisms of sexually transmitted diseases. They are considered to be a threat to Public health.<sup>3</sup> Most of these infections are not diagnosable due to lack of symptoms, the antibacterial effect of sperm, the higher possibilities of contamination with other urethral organisms and the difficulty of culturing.<sup>3,4</sup> Numerous researchers have attempted to study the association between genital Mycoplasma infections and infertility. Several epidemiological reports have documented the presence of *M. hominis*, *M. genitalium* and *U. urealyticum* in infertile women.<sup>5,6</sup> Also in vitro studies have shown that sperm samples infected with these Mycoplasmas undergo detrimental changes in sperm count, sperm velocity and motility parameters.<sup>7</sup> The pregnancy success rate of in vitro fertilization (IVF) might be reduced as a result of prior mycoplasma colonization of the female and male genital tract.<sup>3</sup>

## MATERIALS AND METHODS

The study was conducted on 100 women, divided into two groups: 60 cases with unexplained infertility (study group) and 40 cases with confirmed fertility (control group). Three cervical swabs were collected from each case and sent for bacteriological examination for mycoplasmas. Inclusion criteria for the study group is unexplained infertility and exclusion criteria is confirmed fertility and its just reverse for the control group. Present study was conducted from August 2012 to August 2014 in a Medical College and Hospital, Kolkata. For the detection of *M. genitalium*, the endocervical specimen was inserted in a buffer solution, using Cobas Amplicor specimen transport medium collection tubes (Roche Diagnostic Systems). The samples were stored at 4°C until transport to the Microbiology Dept. laboratories within 12 hours of collection. These specimen were kept at -20°C until sample collection from 30 specimen were completed. Culture for genital mycoplasmas. Specimens were inoculated onto A7agar(Becton Dickinson, Cockeysville, Md. 21030) and

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## INTRODUCTION

In humans, infertility may describe a woman who is unable to conceive as well as being unable to carry a pregnancy to full term. There are many biological and other causes of infertility, including some that medical intervention can treat.<sup>1</sup> Women reproductive system harbours various pathogen and non pathogen microorganisms. Mycoplasmataceae is a family of bacteria which cause urogenital infections

Analysis, organism, and primer or probe	Target or DNA sequence (5'-3')	Length (bp)
Mycoplasma hominis	RNAH1 CAATGGTAATGCCGGATAACGC	334bp
Mycoplasma hominis	RNAH2 GGTCCTCAGTCTGCAAT	334bp
Mycoplasma genitalium	MG16-45 F TACATGCAGTCGATCGGAAGTAGC	282bp
Mycoplasma genitalium	MG16-447R AAACCTCCGCCATTGCCTGCCTGCTAG	282bp
Ureaplasma urealyticum	U4 primer ACGACGTCCTAAGCACT	429bp
Ureaplasma urealyticum	U5 primer CAATCTGCTCGTGGTATTAC	429bp

**Table-1:** Nucleotide sequences of primers and probes used

incubated at 37°C in 5% CO<sub>2</sub> for 5 days. For Urea plasma it is inoculated in 10% urea supplemented broth. Cultures were examined microscopically daily for 5 days for the appearance of typical mycoplasma colonies. A7 agar incorporates a direct test for urease that allows the differentiation of ureaplasma from the other Mycoplasma species. Specimens were also inoculated in Urogenital Mycoplasma broth incorporated with yeast extract, Horse Serum, vitamin and mineral growth supplements and then followed by subculture in to A7 agar. Multiplex PCR assay for genital mycoplasma infection. Bacterial DNA from 100 microlitre of specimen or transport media was isolated by lysis in 400 micro litre of lysis buffer, extracted with an equal volume of phenol-chloroform-isoamyl alcohol (25:24:1), and extracted again with chloroform-isoamyl alcohol. DNA was then precipitated in 100% isopropanol, washed in 70% ethanol, and suspended in 15 micro litre of RNase-DNase free sterile deionized water (Sigma, St. Louis, Mo.). Multiplex PCR was performed with primers specific for highly conserved regions in the urease gene of *Ureaplasma* spp, the 140-kDa adhesion protein gene of *M. genitalium*, and the 16S rRNA gene of *M. Hominis*. 50 microlitre reactions containing a 0.2 mM concentration of de-oxy nucleoside triphosphate mixture, 10mM Tris, 3mM MgCl<sub>2</sub>, 25pmol of each unlabeled forward primers, and 25pmol of biotin-labeled reverse primer (Table 1) and 1.25U of Gold Taq (Applied Biosystems.). All reactions were performed in a Thermo cycler under the:

## FOLLOWING CONDITIONS

First cycle at 95°C for 10 minutes, after that at 95°C, 35 two-step cycles for 15s and 60°C for 60s, after that 5min at 72°C for PCR product detection. Enzyme-linked oligosorbent assay (ELOSA) was used for the detection of the PCR products of Urea plasma and *M. genitalium*. Further evaluation by digestion with NarI was done for *M. hominis*, which results in the digestion of *M. hominis* PCR product to fragments of 62 and 272bp Analytical sensitivity. The analytical sensitivity was determined by amplification of twofold serial dilutions of DNA of the bacteria, either individually or all three organisms as a mixture. 3.13 to 100CFU dilutions were done. The CFU equivalent of DNA in the last sample positive in the dilution series was the lower limit of detection (LOD).

## RESULTS

Mycoplasmas were isolated from 14 cases (28%) in study group and two cases (4%) in the control group. Out of these, 6 cases and 1 case in the study and control group respectively

were positive for *U. urealyticum* and the difference was statistically highly significant. *Mycoplasma hominis* was found to be positive in seven cases and one case in the study and control group respectively and was statistically insignificant ( $P > 0.05$ ). The colonization of mycoplasmas was maximum in the age group 26-30 years and low socio economic group. *Mycoplasma genitalium* was found to be positive in one case and no case in the study and control group respectively.

## DISCUSSION

Many researchers have attempted to study the role of genital Mycoplasma infections and infertility. Several epidemiological reports have documented the presence of *M. hominis*, *M. genitalium* and *U. urealyticum* in infertile women.<sup>5,6</sup> Our study also goes with these researchers findings. *M. genitalium* likely maintains persistent infection through intracellular survival in mucosal epithelial cells,<sup>8,9</sup> resulting in inflammation.<sup>8,10</sup> The observed correlations between *M. genitalium* reproductive tract infection and infertility may be explained by long-term inflammation elicited by *M. genitalium* infection.<sup>10</sup> From the uterine cervix of infertile women attempts were made to isolate mycoplasmas and normal pregnant and nonpregnant women to investigate the relationship of urogenital mycoplasma infection to infertility. *Ureaplasma urealyticum* and *M. hominis* were isolated.<sup>11</sup> Female genital tract infections are one of the reasons of infertility. Gnarp and Friberg first suggested an etiologic role of *Mycoplasma* in infertility by demonstrating a high frequency of positive cultures recovered from the cervixes of women with unexplained infertility compared with those of the fertile pregnant control subjects. DeLouvois et al. studied 120 patients with infertility of various etiologies and found a 52% incidence of cervical ureaplasma. They also found a 55% incidence in 92 pregnant patients. Matthews et al. and Nagata et al. found similar results. Gump et al. studied 20 patients with infertility for longer than year and obtained cultures from the cervix and endometrium for *Mycoplasma* and *Ureaplasma*.<sup>12-15</sup>

## CONCLUSION

Many types of genital infectious diseases (such as cervicitis, pelvis inflammatory disease) are caused by *M. hominis* and *U. urealyticum*, for infertility, but their actual role in obstetrical pathologies (premature delivery, premature rupture of membranes, chorio-amnionitis) and neonatal infections has not been proven. Doubts about their role still exist whether these mycoplasmas are pathogens or mere co-factors associated with genital infections. *M. genitalium* has been proven

pathogen of genital tract; new studies will be necessary so that one has a better understanding of the pathologies it can induce. Our study also shows their certain role in infertility and more study need to be done to confirm their role in infertility

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# Management of Recurrent Pneumothorax and Broncho-Pleural Fistula by Closure of Infected Bullae via Flexible Bronchoscopy Guided Instillation of Silver Nitrate

Sameer Singhal<sup>1</sup>, Anand S<sup>2</sup>, Alok Ranjan Singh<sup>2</sup>, Abinav Dagar<sup>2</sup>, Ankit Sharma<sup>2</sup>

## ABSTRACT

**Introduction:** A pneumothorax is defined as the accumulation of air in the pleural space with secondary collapse of the surrounding lung. Pneumothoraces can be divided into spontaneous pneumothorax and traumatic pneumothorax. Spontaneous pneumothorax is subclassified as either primary spontaneous pneumothorax or secondary spontaneous pneumothorax. They are sometimes complicated by a persistent air leak or bronchopleural fistula requiring prolonged chest tube drainage. Non-surgical treatment of persistent broncho-pleural fistula is often performed in patients who are poor surgical candidates, but the ideal method of closure is surgery.

**Case Report:** The current article is regarding a 55 yr old male patient who presented to the department with left sided pneumothorax and ICD in situ. He had a history of recurrent pneumothorax and a Broncho Pleural Fistula which was closed non surgically using silver nitrate.

**Conclusion:** Pneumothorax is a very common condition and very frequently it is complicated by the presence of broncho-pleural fistula which in turn leads to persistence of ICD tube for a long time there by affecting the quality of life of the patients and additional chance of secondary infection, since a long time surgery is considered as the only option but in patients who are not fit for surgery, Silver nitrate aided Broncho Pleural Fistula closure is an option and is cheaper and less invasive.

**Keywords:** Pneumothorax, ICD tube, Bronchopleural Fistula, Surgery, Silver Nitrate

## INTRODUCTION

A Secondary Spontaneous Pneumothorax (SSP) is defined as a pneumothorax that occurs in the presence of a pre-existing lung disease.<sup>1</sup> Most commonly associated conditions are Chronic Obstructive Pulmonary Disease, Cystic fibrosis, Carcinomas and Infectious diseases (eg, bacterial or fungal pneumonia, Pneumocystis jirovecii pneumonia, and chronic tuberculosis).<sup>2,3</sup>

Pneumothoraces are sometimes complicated by a persistent air leak or bronchopleural fistula requiring prolonged chest tube drainage. Non-surgical treatment of persistent broncho-pleural fistula is often performed in patients who are poor surgical candidates, but the ideal method of closure is surgery.

## CASE REPORT

A 55 yr old male patient presented to the department with left sided pneumothorax and ICD in situ. Patient had shortness of

breath and chest pain since two months, he was immediately admitted in a peripheral hospital where ICD (Intercostal drainage tube) was inserted and further chest X-rays showed complete resolution. ICD tube was removed after 3 days and patient was discharged. Three days later patient developed acute shortness of breath, chest X-ray showed hydro-pneumothorax and an ICD was re-inserted. When the chest X-ray showed complete lung expansion, Betadine pleurodesis was performed and subsequently ICD tube was removed. He is a chronic smoker with a Smoking Index (SI)>500 and had Pulmonary Tuberculosis 8 years back for which he had taken complete treatment. After 1 week post ICD removal he again developed shortness of breath and chest x ray (Fig-1) showed Pneumothorax and ICD no. 24 was inserted which relieved him of his breathing difficulties. Patient was discharged with ICD in situ with persistent continuous air leak and referred to our department

Initially on arrival ICD tube was removed and an ICD of increased diameter 32No. (Fig-2) was inserted but it did not help much in improving the patient condition

Further a contrast enhanced CT scan of thorax was performed which suggested the presence of multiple infected bullae and the rupture of an infected bullae communicating with the pleural cavity behind the etiology of recurrent pneumothorax and persistent bronchopleural fistula. He was having history of chronic low grade fever with night sweats but was sputum negative and empirical category 2 anti tuberculous treatment was started, following one week of ATT intake and in view of persisting continuous air leak, patient was posted for flexible bronchoscope guided closure of bullae and bronchopleural fistula with 0.3 % silver nitrate. Procedure was uneventful and immediately post procedure there was drastic improvement and gradually over the following days there was complete absence of air leak suggesting closure of broncho- pleural fistula and ICD tube was removed as chest X-ray shows complete resolution and complete lung expansion (Fig-3).

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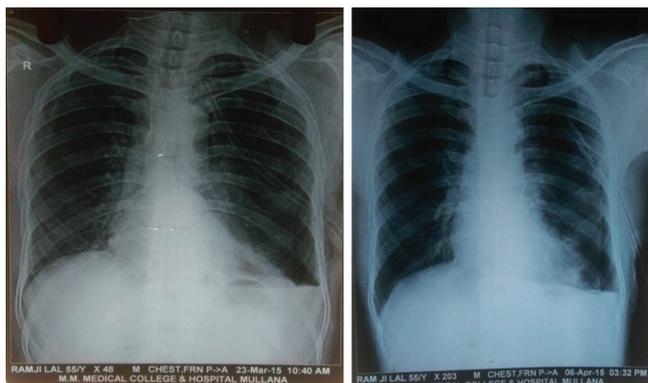


Figure-1: Provide legend; Figure-2: Provide legend

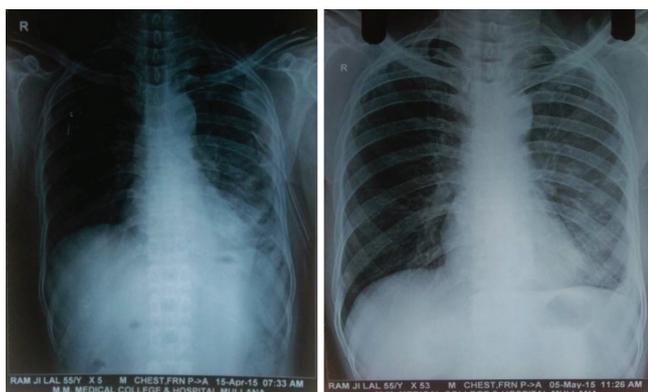


Figure-3: Provide legend; Figure-4: Provide legend

Patient was discharged on Category 2 ATT and further follow up Chest X rays showed marked resolution of parenchymal infiltrates (Fig-4).

## DISCUSSION

A pneumothorax is air in the pleural space, that is, air between the lung and the chest wall. Pneumothoraces can be divided into spontaneous Pneumothoraces, which occur without antecedent trauma or other obvious cause, and traumatic Pneumothoraces, which occur from direct or indirect trauma to the chest.

Most secondary spontaneous Pneumothoraces are due to COPD (Chronic Obstructive Pulmonary Disease), although almost every lung disease has been reported to be associated with secondary spontaneous pneumothorax.<sup>4</sup> Tuberculosis was the second leading cause of secondary spontaneous pneumothorax after COPD in endemic areas.<sup>5</sup>

COPD patients are sometimes complicated by the presence of emphysematous bullae. A bulla is an air-containing space within the lung parenchyma that arises from destruction, dilatation, and confluence of airspaces distal to terminal bronchioles and is larger than 1 cm in diameter.<sup>6,7</sup>

A superinfection within a bulla can occur with clinical manifestations including fever, cough, purulent sputum production, dyspnea, and pleuritic chest pain.<sup>8,9</sup> Spontaneous pneumothorax may be a complication of bullous disease, particularly in patients who continue to smoke. The typical presentation is a sudden onset or worsening of dyspnea with or without pleuritic chest pain. Ultrastructural assessments

suggest the possibility of air leaking through the wall of the bullae with sloughing of mesothelial cells.<sup>10</sup> Patients with pneumothorax secondary to tuberculosis should have surgery if the airleak persists more than a few days or if they have a relapse.<sup>4</sup>

Here in this case patient is been treated with .3% silver nitrate after localization of bronchopulmonary segment with the aid of bronchoscope and methylene blue and the results were highly satisfactory and empirical ATT was started which showed significant clinical and radiological improvement.

## CONCLUSION

Pneumothorax is a very common condition and very frequently it is complicated by the presence of broncho-pleural fistula which in turn leads to persistence of ICD tube for a long time there by affecting the quality of life of the patients and additional chance of secondary infection, since a long time surgery is considered as the only option but in patients who are not fit for surgery, Silver nitrate aided Broncho Pleural Fistula closure is an option and is cheaper and less invasive.

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# Adnexal Torsion During First Trimester of Pregnancy: A Case Report

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## ABSTRACT

**Introduction:** Adnexal torsion is an emergency condition where the adnexa rotate on its pedicle compromising their blood supply. It is a rare cause of acute abdominal pain during pregnancy and a true obstetric emergency. Here we report a case of adnexal torsion during pregnancy without any predisposing factor.

**Case Report:** A 22-year-old primigravida at 11 weeks of Gestational Age presented with abdominal pain and vomiting. With the working diagnosis of torsion of ovary, laparotomy was done which revealed torsion of right adnexa thrice for which salpingo-oophorectomy was performed. Her post-operative period was uneventful with a viable intrauterine pregnancy.

**Conclusion:** The diagnosis of adnexal torsion during pregnancy is often missed due to non-specific clinical features and uncommon objective findings. Treatment options are limited to surgery either by laparoscopy or laparotomy but the former becomes more difficult in the second trimester. Earlier decision to proceed with surgery is difficult due to the diagnostic dilemma and also considering the pregnancy.

**Keywords:** adnexal torsion, pregnancy, doppler

## INTRODUCTION

Adnexal torsion is a rare cause of acute abdomen during pregnancy. The incidence of adnexal torsion is 5/10000 pregnancies.<sup>1</sup> As this condition is very rare, a high index of suspicion is required to arrive at our diagnosis. The clinical findings of torsion are non-specific. The exact role of imaging techniques is debated.<sup>2</sup> Treatment of adnexal torsion is considered as an emergency because peritonitis and death can result.<sup>3</sup> Although it is seen more frequently in patients undergoing ovarian stimulation in the treatment of infertility and in patients who have had an ovarian cyst diagnosed before, here we report a case of adnexal torsion during pregnancy without any predisposing factor.

## CASE REPORT

A 22-year-old primigravida presented to our Department of Obstetrics and Gynaecology at 11 weeks of Gestational Age based on her Last Menstrual Period with intractable vomiting and right-sided abdominal pain. She had no fever and gave negative history for vaginal bleeding or discharge. There was no previous history of ovarian cyst or ovarian stimulation. No history of recent sexual intercourse.

On examination, the patient was afebrile with no pallor and edema. Her vital signs were stable. Her cardiovascular and respiratory system was normal. Abdominal examination revealed tenderness on right iliac fossa without guarding and rigidity or palpable mass. On pelvic examination, uterus was

soft and 12 weeks palpable with right forniceal fullness without tenderness. Left fornix was free. Cervix was soft with os closed.

All her blood and urine investigations were within normal limits. Trans-vaginal sonography showed a single live intra-uterine gestation of 11 weeks + 4 days with a simple cyst in right ovary measuring 3.8 × 2.3 cms with decreased vascularity on color Doppler. Because the diagnosis of adnexal torsion cannot be made only by decreased vascularity, we had a diagnostic dilemma. Considering her pregnancy, the decision was made to treat the patient conservatively with close monitoring. Patient had slight improvement of her symptoms initially. But 12 hours later, she developed increasing pain with tachycardia and diffuse tenderness in all quadrants of abdomen. Repeat Trans-abdominal sonography shows increased ovarian volume compared to previous scan with significant free fluid in peritoneal cavity. With the provisional diagnosis of pregnancy with torsion ovary cyst and with possible differential diagnosis of appendicitis, emergency laparotomy was planned. The patient was counselled regarding the risk of abortion related to surgery. Informed and written consent for laparotomy with possibilities of salpingo-oophorectomy was obtained.

On laparotomy, around 50 ml of blood stained fluid noted in the peritoneal cavity. The right adnexa was gangrenous and had undergone torsion three times around its pedicle. Uterus was gravid and left adnexa was normal, appendix was normal. Right salpingo-oophorectomy was performed and sent for histopathology. Histopathological examination confirmed the finding as necrosed ovary and fallopian tube. After laparotomy, patient was administered intramuscular micronized progesterone daily and HCG weekly twice for 2 weeks. Her post-operative period was uneventful with viable intrauterine pregnancy confirmed on her second post-operative day. She is now in her third trimester of pregnancy and on regular antenatal checkup.

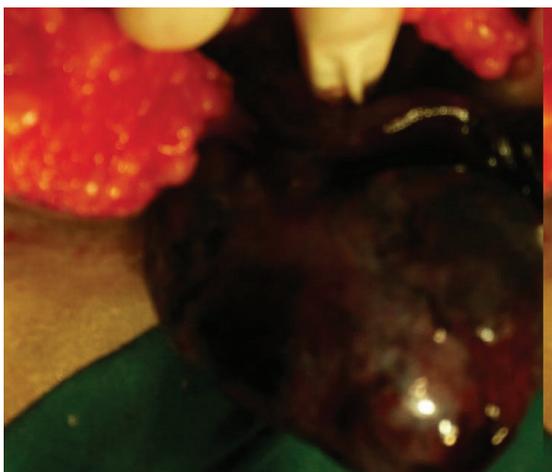
## DISCUSSION

Adnexal torsion is the condition where the adnexa rotates on its pedicle compressing its blood supply leading to stasis, venous congestion, haemorrhage and necrosis. The signs

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**Figure-1:** Torsion of Right adnexa with gangrenous appearance

of adnexal torsion include a palpable pelvic mass, signs of localized peritoneal irritation, a low grade fever, and leukocytosis. Preoperative diagnosis is difficult, especially in pregnant women. Patient usually presents with acute abdomen and pelvic examination may reveal a tender cystic mass separate from the uterus. During pregnancy, the clinical symptoms are non-specific and could be confused with other acute abdominal conditions such as acute appendicitis, ruptured corpus luteum cyst, adnexal abscess, ovarian hyperstimulation, urinary obstruction, and ectopic pregnancy. Ultrasonography is the primary imaging modality for evaluation of adnexal torsion. Ultrasonography features of adnexal torsion include a unilateral enlarged ovary, uniform peripheral cystic structures, a coexistent mass within the affected ovary, free pelvic fluid, lack of arterial or venous flow, and a twisted vascular pedicle.<sup>4</sup> Colour Doppler sonography showing absence of intraparenchymal ovarian blood flow seems to be a promising tool in a diagnosis of adnexal torsion.<sup>5</sup> However, a decreased blood flow can also indicate an incomplete torsion.

Expedient surgery is the treatment of choice for adnexal torsion. Treatment of adnexal torsion is considered an emergency because peritonitis and death can result. Standard surgical techniques for management of adnexal torsion include laparotomy with detorsion or salpingo-oophorectomy.<sup>6</sup> Although laparoscopic approach combined with simple detorsion has been described recently, laparotomy and salphingo-ooperec-tomy may sometimes be necessary as in our case.<sup>7</sup> Several recent reports have described successful conservative management with untwisting of the twisted adnexa.<sup>8</sup>

The decision to proceed to surgery during pregnancy is somewhat complex as in our case, since the well being of both mother and fetus must be taken into account. The risk of any surgery to the pregnancy will depend on the gestational age. In the first trimester when ovarian torsion most often occur in pregnancy, the risk of fetal loss is the smallest with modern anaesthetic techniques. Role of progesterone and other tocolytics during and after surgery is still controversial. However, if the corpus luteum cyst is removed during salpingo-oophorectomy, supplemental progesterone and human chorionic gonadotropin is indicated.<sup>5</sup>

In a study done by Chang et al on surgical intervention for maternal ovarian torsion in pregnancy, out of 20 pregnant women operated for ovarian torsion 12(60%) had term deliveries, 3(15%) preterm deliveries, 1 missed abortion and 4 elective abortions in the first trimester.<sup>9</sup>

## CONCLUSION

Adnexal torsion, even though is a rare condition in pregnancy, it should be one of the differential diagnosis of acute abdomen and may occur even in the absence of cysts or any predisposing factors.

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# Superficial Dermatophytosis: A Study of Clinical Variants and Mycological Isolates

Deena Patil<sup>1</sup>, Neelima. A<sup>2</sup>

## ABSTRACT

**Introduction:** Fungi are ubiquitous in nature. Dermatophytosis is the infection of keratinized structures caused by members of the fungi of the genera *Trichophyton*, *Epidermophyton* and *Microsporum*. Because of varied clinical presentation of dermatophytosis, and also mimics various other dermatological condition, there is a need for appropriate diagnosis and management of the condition.

**Materials and method:** The study group comprised of 120 patients of clinically diagnosed superficial dermatophytosis. Depending on the site the samples were collected from skin, nails, hair, and scalp and sent to microbiology lab KOH mount and culture.

**Results:** Out of 120 cases 88 were males (73.33%) and 33 females (26.67%). Male to Female ratio was 2.75:1. Majority of the patient were in age the group 21-30 years (24.16%). Amongst the various clinical types of dermatophytosis, tinea corporis was the commonest clinical type (47.5%). Amongst the cases of tinea corporis, classical annular type was most common (35%) *Trichophyton rubrum* was the predominant species isolated from all clinical types except *Tinea capitis*. (77.5%)

**Conclusion:** Tinea corporis was the commonest clinical type and annular type of variant was the most common presentation. *Trichophyton rubrum* was the most common isolate, thus concluding that it is the most common cause of superficial dermatophytic infection. Many patients were diabetic or on steroid therapy in our study thus concluding that the associated diseases are predisposing factors for chronic and recurrent dermatophytic infection.

**Keywords:** dermatophytes, tinea corporis, clinical variants, *t. rubrum*

## INTRODUCTION

Fungi are ubiquitous in nature. It has been estimated that there are 2,50,000 to 3,00,000 species of fungi distributed in ecosystem. Pathogenic fungi include 80 genera and disease caused by fungi are collectively known as Mycoses.<sup>1</sup>

The prevalence of superficial fungal infections is highly variable, since it depends on climatic parameters such as humidity and temperature, and on each patient characteristics such as age, gender, predisposition to diseases, and anatomical site of lesion, socioeconomic status, and occupation.<sup>2-4</sup>

Dermatophytosis is the infection of keratinized structures caused by members of the fungi of the genera *Trichophyton*, *Epidermophyton* and *Microsporum*. These fungi are adapted to infect keratinized tissues by virtue of their ability to utilize keratin as a nutrient source. Sites of infection include hair, nails, and the stratum corneum of the skin. More than 40 dermatophyte species that infect humans (anthropophilic),

animals (zoophilic) or are present in soil (geophilic) have been identified. The infections caused by the anthropophilic species tend to be chronic but the resultant inflammation is minimal. About 90% of chronic dermatophyte infections are caused by *T. rubrum* and *T. mentagrophytes*, possibly because these organisms may suppress inflammation and cell-mediated immunity.<sup>5</sup> Various studies show increasing incidence of dermatophytosis in HIV infected patient in early stage of infection with its atypical presentation. Because of varied clinical presentation of dermatophytosis, and also mimics various other dermatological condition, there is a need for appropriate diagnosis and management of the condition. This study was undertaken to know the clinical variants in different types of superficial dermatophytosis and to determine the culture characteristics of the isolates.

## MATERIALS AND METHOD

The study group comprised of 120 patients of clinically diagnosed superficial dermatophytosis attending the outpatient Department of Dermatology, Venerology and Leprosy at KIMS, Hyderabad from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2013.

The cases were selected on random basis, newly diagnosed and untreated cases were selected for the study. The study was approved by the ethical committee of the institution. Informed consent was taken from all cases.

**Inclusion criteria:** Clinically diagnosed cases of superficial dermatophytosis.

**Exclusion criteria:**

Only onychomycosis

Candidia intertigo

Pityriasis versicolor.

**Method of collection of data:** A detailed clinical history including age, sex, socioeconomic status, occupation, duration of disease, history of recurrence and type of lesion, similar complaints in the family and contacts with animals

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or soil were elicited and recorded in all cases. General physical examination and systemic examination was conducted and investigations like hemoglobin, total count, differential count, blood sugar, and liver function test were done whenever necessary.

### Specimen collection

In case of skin lesion, the scraping was taken from the active border of the lesion by moving the scalpel perpendicular to the skin surface after cleaning the area with spirit. In case of nail infection, nail clippings of the affected nail were collected. In cases involving the hair, the affected hairs plucked. Scrapings were also collected from the scalp. All the specimens were collected in folded strips of sterile paper which were transported to the mycology laboratory.

**Direct microscopy:** The scraping was placed on a clean sterilized glass slide, and drop of 10% KOH and covered with a cover slip using a gentle pressure. For hair and nail sample 20%KOH was used. The slides were examined under low power for evidence of fungal hyphae and spores.

**Culture:** For culture, the medium used was commercially available Sabouraud's Dextrose agar with cycloheximide and chloramphenicol to prevent growth of contaminants. The scrapings were inoculated into the agar slant and was incubated at 25°C. The identification of the fungal colonies was done based on their gross morphology and microscopic features. Microscopic examination was done by preparing teased mounts from the isolates with a drop of lactophenol cotton blue.

After collection of clinical specimen the patients were treated with appropriate local and / or oral antifungals on the basis of clinical diagnosis.

## RESULTS

120 cases of clinically diagnosed superficial dermatophytic infection patient were included in the study after obtaining consent.

Out of 120 cases, 88 were males (73.33%) and 33 females (26.67%). Male to Female ratio was 2.75:1.

Majority of the patient were in the age group 21-30 years (24.16%). The lowest age was 20-day-old female and the highest 78 yr old male. (Table 1)

Most of the patients belonged to low socio-economic status (46.67%). Labourers were commonly affected (48.34%). Majority of patient presented within 10 weeks of infection

(30.8%).

Among the various clinical types, tinea corporis was commonest clinical type (47.5%), tinea cruris was second most common (20.8%), followed by tinea faciei, mixed and tinea pedis and tinea manuum (fig.1).

Amongst the cases of tinea corporis, classical annular type 42 cases (35%), was most common; papulosquamous variant (17.5%) was the most common variant in T.cruris, Chronic intertriginous type (7.5%) in T.pedis, Hyperkeratotic type (4.17%) in T.manuum and annular (7.5%) in T.faciei (table 2)

Distal superficial onychomycosis was (3.70%) was the most common variant of t.unguium seen in mixed infection.

In 93 cases, (77.5%) fungal elements were demonstrated by direct microscopy. 49 cases (40.83%) were culture positive. 41 cases (34.16%) were positive both microscopically as well on culture. Out of 49 culture positive cases, 46 (93.88%) cases belonged to genera Trichophyton.

T.rubrum was the predominant species isolated from all clinical types except t.capitis. T.mentagrophytes was isolated from many clinical type except tinea.pedis, tinea.manuum. Fusarium (NDM) was isolated for one case of tinea corporis in immunocompromised patient.

22 cases were associated with diabetes mellitus, 8 cases with atopy, 5 cases were HIV positive, 1 HBs Ag positive and 4 cases were on steroid therapy.

## DISCUSSION

Superficial mycosis is more prevalent in tropical and sub tropical countries including India where heat and moisture play an important role in promoting growth of these fungi.<sup>6,7</sup> The difference in incidence of ring worm infection between the age group and sexes seems in general to reflect differing rates of exposure and of sebum production, differing clothing and fluctuation of immunity with old age.<sup>8</sup>

Dermatophyte infections are in general less prevalent in females. Hormonal factors may predispose to infection, progesterone is an effective inhibitor of fungal growth. The male dihydrotestosterone is an effective inhibitor of progesterone binding site.<sup>9,10</sup>

Atopic individuals are notoriously susceptible to chronic dermatophytosis. A likely explanation is that atopy, in which over active type2 T-helper lymphocytes (T<sub>H</sub>2) induce immediate hypersensitivity responses to antigen, inhibits or over powers the ability of T<sub>H</sub>1 cells to maintain a DTH responses.<sup>11</sup>

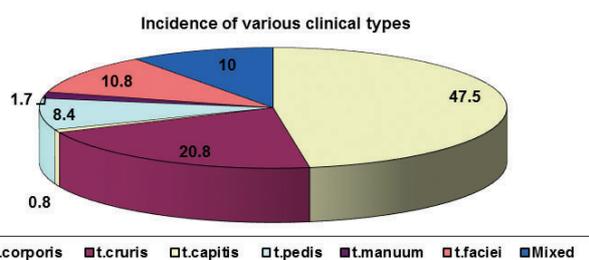
Clinical type	<1 yr	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71 & above	Total
T.corporis			8	15	11	8	11	4		57
T.cruris			4	7	5	4	3		2	25
T.capitis		1								1
T.pedis			5	2	1		2			10
T.manuum					1				1	2
T.faciei	1		3	5	2	2				13
Mixed		1	1	2	2	3	1	2		12
Total	1	2	18	29	25	17	19	6	3	120

Note: T-Tinea

**Table-1:** Age (yrs) wise distribution of clinical types of dermatophytosis

Clinical variants	Tinea corporis	Tinea cruris	Tinea Capitis	Tinea pedis	Tinea Manum	Tinea faciei	Mixed	Total
Annular	9						3	42
Eczematous annular	10							10
Plaque	8						1	9
Papulosquamous		19					2	21
Vesiculopustular		6						6
Non-inflammatory (grey patch)			1					1
Chronic intertriginous				8			1	9
Vesicular				2				2
Chronic hyperkeratotic				0			3	3
Vesicular					1			1
Hyperkeratotic					1		4	5
Annular						7	2	9
Papular						3		3
Erythematous patch						3		3
DSO							5	5
TDO							3	3
Total	57	25	1	10	2	13		

**Table-2:** Clinical variants of dermatophytosis



**Figure-1:** incidence of various clinical types of dermatophytosis

In our study it was observed that males were more commonly affected than females giving a male: female ratio of 2.75:1. Most of the workers in India have also reported a higher male incidence with male to female ratio ranging from 1.5:1 to 3:1.<sup>12</sup> This higher male incidence is due to higher physical activity in males leading to excess of perspiration in a hot humid climate.

In the present study, incidence was seen to be highest in age group 21-30 years. The next highest incidence was in group 31-40 years. The two extremes of age showed the least incidence of infection. The findings are consistent with other studies.<sup>13-16</sup> This is probably due to the heavy physical activity predisposing to increased perspiration.

An analysis of socioeconomic states of the patient indicates that majority of patients with dermatophyte infection belong to low-income groups (46.6%). These findings are similar to other studies.<sup>17,18</sup> The reason that low socioeconomic strata of society is more affected, is due to prevalence of poor hygienic practices and overcrowding. Labourers formed majority of our cases (48.34%). This is due to heavy physical work which predisposes them to excess perspiration in a humid environment.

Tinea corporis was the commonest clinical type (47.5%) followed by Tinea cruris (20.8%) which was the next commonest. This finding is consistent with other studies in India.<sup>13</sup> The lowest incidence was of Tinea capitis, (0.8%) which was

similar in other studies.<sup>7</sup> In our study, there was not a single case of Tinea barbae. This was similar to other study.<sup>17</sup>

Our KOH positivity rate 77.5% was close to that found by other workers in rest of the country 76% and 77% respectively.<sup>6,7</sup> our culture positivity rate is 40.83%, the findings were close to other studies.<sup>13</sup> In the present study, NDM was isolated from a case of Tinea corporis in a HIV patient. The similar finding was found in other study.<sup>19</sup>

Although we could detect fungal hyphae, on direct microscopy in 77.5% cases, we could culture the fungus in only 40.83% of cases. This discrepancy among the 2 methods of fungal detection has been noticed by all other workers and could possibly be the result of various contributory factors involved in collection, transport, inoculation and incubation of specimen.

In the present study, 6.6% of cases showed a negative KOH, but a positive culture result. The reason for this could be due to the fungal hyphae being missed in KOH smear.

Among the Trichophyton genera the majority of case showed T.rubrum species (79.59%) followed by T.mentagrophytes (12.25%) and then T. Schoenleinii (2.04%). Several reports from various parts of India also show Trichophyton as the commonest genus and T.rubrum as the commonest species. Our finding was close to other studies.<sup>13-16</sup>

The reason for overall high isolation of T.rubrum from most of clinical variants are T.rubrum has an affinity for inhospitable and tough keratin, like that of palms, soles and nails. No age group is spared. T. rubrum infection are highly, communicable. The species have remarkable adaptability.

22 of our patients were diabetics. There is an association reported between diabetes and T.rubrum infection.<sup>20</sup> 21.05% incidence of atopy was recorded. One study has reported that chronic dermatophytic infections are approximately 3 fold more frequent in atopics.<sup>21</sup>

In our study 4 patients were on steroid therapy for different disease. Similar findings were reported in other study.<sup>22</sup>

## CONCLUSION

The study showed a male preponderance and greater association with labourers and low-income group. Majority of patients were in 3<sup>rd</sup> decade and came within a duration of <10 weeks of getting infection.

Tinea corporis was the commonest clinical type and annular type of variant was the most common presentation. Trichophyton rubrum was the most common isolate, thus concluding that it is the most common cause of superficial dermatophytic infection.

Many patients were diabetic or on steroid therapy in our study thus concluding that the associated diseases are predisposing factors for chronic and recurrent dermatophytic infection.

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# Epidemiological Analysis of Maxillofacial Trauma in Patients of Road Traffic Accidents

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## ABSTRACT

**Introduction:** Maxillofacial trauma is without doubt a most challenging area. Injuries to face are common but the majority are relatively minor in nature and these can result from sporting activities, accidents and intentional violence. It must always be remembered that an intact and unscarred face is important to the well being of the individual and thus all injuries should be treated carefully. Despite the many advances in our understanding of tissue healing, biomaterials and surgical techniques, the initial assessment and the timing and undertaking of management of facial injuries in the early stages have remained a difficult area of patients care.

**Materials and method:** The present study was conducted on 75 patients in the department of ENT of Guru Gobind Singh Medical College and Hospital Faridkot

**Results:** The observations were recorded during their stay in the hospital, special attention was paid to record age, sex, causes of injuries, site and nature of injuries, prominent signs/symptoms, complications and radiological findings

**Conclusion:** Appropriate and timely management of facial injuries becomes even more challenging following high velocity trauma, when significant injuries elsewhere may, or may not, take priority. Management of the multiply injured patient requires a co-ordinated multi-disciplinary approach in order to optimize patient's outcome

**Keywords:** Motor vehicular accidents; maxillofacial trauma, nasal fractures

fracture or deform the nasal septal cartilage, whereas greater forces may cause fractures of the nasal bone or facial skeleton involving the paranasal sinuses. There can be a simple crack of the nasal bone without displacement but greater force may result in deviation of the bony nasal complex laterally. A blow directly from the front may depress the bony pyramid or cause a commuted fracture and widening of the bridge of the nose. Violent trauma to the frontal area of the nose can result in a fracture of the frontal and ethmoid sinuses extending into the anterior cranial fossa.<sup>3</sup>

Injuries to face are common but the majority are relatively minor in nature and these can result from sporting activities, accidents and intentional violence. It must always be remembered that an intact and unscarred face is important to the well being of the individual and thus all injuries should be treated carefully. Even trivial blow to the face may cause injuries that compromise the airway, directly or indirectly cause a head injury.<sup>4</sup>

Gassner et al studied patients with cranio-maxillofacial trauma. The study differentiated between injury mechanisms in cranio-maxillofacial trauma. They stated that in facial trauma, older persons are prone to bone fractures (increase of 4.4%/year of age) and soft tissue injuries (increase of 2%/year of age) while younger persons are more susceptible to dentoalveolar trauma (decrease of 4.5%/year of age).<sup>5</sup>

The present study is therefore undertaken to evaluate the clinicoradiological profile of the patients having maxillofacial trauma admitted in GGS medical college and Hospital, Faridkot.

## INTRODUCTION

Injury is the commonest cause of death among people aged 1-34 years, a leading cause of disability and a major contributor to health costs. WHO data suggests that 1 in 10 deaths worldwide is the result of an injury. Currently 5 of the leading 25 causes of mortality are injuries, however the probability of death from trauma varies widely by region sex and age. Injuries from violence account for about 6% of deaths in developed countries whereas 13% of deaths in developing countries. The majority of deaths from trauma occur in economically productive age groups in persons aged between 14-44 years and male to female ratio for deaths from violence is 2:1. Deaths due to trauma are predicted to rise by 65% by the year 2020, by which road traffic accidents will be 3rd most important cause of death worldwide.<sup>1</sup>

Aldman in an analysis of road-accidents mentioned that although trauma is a significant cause of death, perhaps its most tragic aspect is the disability, suffering and economic wastage that results.<sup>2</sup>

Trauma to nose is commonly sustained in sports injuries, street fights and road traffic accidents. Moderate trauma may

## MATERIAL AND METHODS

The present study was conducted in the department of ENT of Guru Gobind Singh Medical College and Hospital Faridkot. A total of 75 cases were studied who were admitted in ENT department or various other departments for whom ENT consultation was called for. The observations were recorded as per proforma attached. During their stay in the hospital, special attention was paid to record age, sex, causes

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of injuries, site and nature of injuries, prominent signs/symptoms, complications and radiological findings

**RESULTS**

This prospective study of profile of patients having ENT trauma admitted in GGS Medical College and Hospital, Faridkot has been carried out on 75 patients, admitted either in ENT department or various other departments for whom ENT consultation was called for from Jan very 2012 to June 2015. The following observations were made.

Majority of the victims (74.6%) were in the prime of their active life i.e. between 16 to 45 years. (fig 1)

Majority of patients i.e. 64 admitted with ENT trauma were males and comprised 85.3% of the total. The remaining 11 patients i.e. 14.66% of the total were females. Male to female ratio was 5.8 to 1.(fig 1)

Our study shows majority of roadside accidents (84%) were because of motor vehicular accident, followed by bicyclists and Pedestrians injuries. (fig 2)

Nasal bleed was the most common symptom present in 40 patients comprising 83.3% of the total followed by headache in 18 (37.5%) and diplopia and blurring of vision were the least commonly present in 1 patient each, amounting to 2.08%. Rest of the symptoms were shown as nasal obstruction 12 (25%), sneezing 3 (6.25%), dysphagia 2 (4.16%) and trismus 2 (4.16%). Nasal bleeding was present in patients having injuries to the nose and maxillo facial injuries.

DNS and local tenderness/pain were the commonest sign presenting in 38 patients (79.16%) out of total 48 followed by nasal deformity presenting in 25 (52.08%). Most of the signs such as DNS and local tenderness/pain were present in patients with nasal injuries.(fig 3)

Out of the total 75 patients who sustained facial injuries, 57 were having evidence of fracture/fractures, as demonstrated by conventional x-ray films. The radiological profile of facial fractures was as shown in fig 4, with nasal bone fracture predominating the list i.e. 76 % followed by maxilla fractures i.e. in 40%, zygomatic, mandible and lefort fractures respectively.(fig 4)

**DISCUSSION**

**Age Incidence**

The majority of patients in our study were in the age group of 16- 30 years i.e. the most active period of an individual’s life, when he is most useful to the society and the country. This age group constituted 44% of the total. The next age group, 31 to 45 years accounted for another 30.6%. So the total number of patients in the age group of 16-45 years constituted 74.6% of the total.(fig 1)

Saidi and Kahoro observed that the mean age was 32 years with a peak incidence in the 20-30 years age group.(6)Hussain et al carried out a study on patients with maxillofacial injuries. Most were males (86%) with age ranging from 13-71 years.<sup>7</sup>

**Sex Incidence**

In this study, 64 patients (85.3%) were males and 11 i.e.

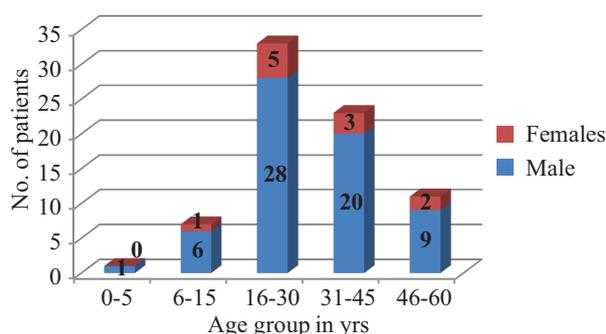
14.6% were female. Male to female ratio in our study was 5.8:1 (fig 1)

Hussain et al carried out a study on maxillofacial injuries. 86% patients were males with a male to female ratio of 6:1 (7)

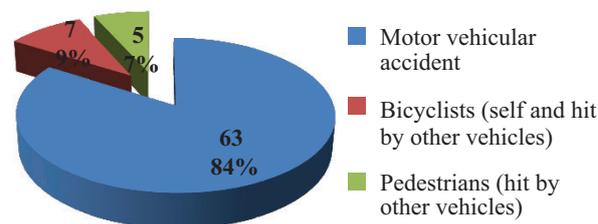
**Cause of Injuries**

Out of the total 75, 63 (84%) were injured in a variety of motor vehicle (self and intervehicular) accidents, 7 (9.33%) were the bicyclists (self and hit by other vehicles) and 5 (6.67%) were the pedestrians. (fig 2)

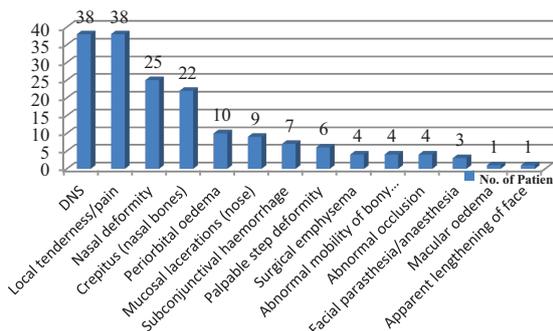
Saidi and Kahoro studied clinical and epidemiological profile on automobile injuries. The predominant category of road user injuries was the vehicle occupant (70%), pedestrians constituted only 21.3%.<sup>6</sup>



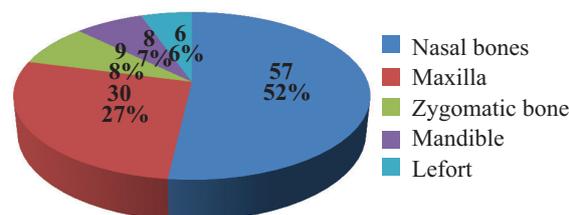
**Figure-1:** Age and sex distribution



**Figure-2:** Analysis of road-traffic accident



**Figure-3:** Signs of maxillofacial injuries



**Figure-4:** Analysis of facial trauma

### Facial Injuries

Out of the total patients 57 (76%) had evidence of fracture/fractures on x-ray films. 18 patients had some type of soft tissue injury on face i.e. bruises, abrasions, lacerations etc. Hussain et al in their study on maxillo facial injuries found that mandible was the commonest to be involved in such injuries followed by maxilla. Most of the patients (32%) had associated facial injuries.<sup>7</sup> Khan and Arif in their study on ENT injuries reported that most were in nasal region (50%) and nasal bone fracture was the commonest (26%).<sup>8</sup>

### Radiological Profile

75 patients who sustained injuries on face, nasal bones were fractured in maximum number of patients i.e. in 57 (76%). This figure also included 6 patients having Le-forte fractures. The rest of the bony injuries on face in the order of frequency were as under: maxilla fracture in 30 (40%), zygomatic bone fracture in 9 (12%), mandible fracture in 8 (10.67%), Le-forte fractures in 6 (8%).

Hussain et al in their study on maxillo facial injury concluded that mandible was the commonest to be involved in such injuries followed by maxilla. Most of the patients (32%) had associated facial injuries.<sup>7</sup> Khan and Arif in their study on ENT injuries reported that most were in nasal region (50%) and nasal bone fracture was the commonest (26%).<sup>8</sup>

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## CONCLUSION

Road Side accidents are the commonest cause of injuries as compared to the assaults. The unruly traffic, poor condition of the Indian roads, unexpected behavior of animals on the roads, liberal use of alcohol by the heavy vehicle drivers on their long journeys inadequate drunk driving laws, lack of alcohol and drug screening and the lack of seat belt and helmet laws are the reasons in general, responsible for excessive road side accidents in our country.

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# Effect of Diode Laser on Clinical Parameters in Aggressive Periodontitis Patients - A Pilot Study

Vijayendra Pandey<sup>1</sup>, Neerav Dutta<sup>2</sup>, Rohit Singh<sup>3</sup>, Satyendra<sup>4</sup>, C.K. Singh<sup>4</sup>, Anup Kumar<sup>5</sup>

## ABSTRACT

**Introduction:** The anti-inflammatory and antibacterial properties of laser are desirable assets which validates its use in the treatment of periodontitis. Hence the present study was planned and conducted to evaluate the efficacy of laser as adjunct to scaling and root planing.

**Materials and Methods:** Fifteen patients (8 males and 7 females) in the age group of 30-55 years diagnosed with aggressive periodontitis were selected for the study. Two teeth were selected in each patient that readily bleeds on probing on the initial visit. Of the selected 30 sites, 15 were test sites (group A) which was followed with diode laser (980 nm) after scaling and root planning and 15 were control sites (group B) which were only treated with scaling and root planning. Mean values were compared with Chi-square test. P value <0.05 was considered as the level of significance.

**Results:** In group A reduction in plaque scores was observed from  $2.15 \pm 0.53$  to  $0.94 \pm 0.61$ , gingival index reduction was observed from  $2.25 \pm 0.19$  to  $1.19 \pm 0.50$ , and probing pocket depth, reduction was observed from  $4.34 \pm 0.91$  to  $3.31 \pm 0.61$  after 30 days. In group B plaque scores from  $2.08 \pm 0.67$  to  $1.21 \pm 0.56$ , gingival index  $2.89 \pm 0.65$  to  $1.94 \pm 0.36$  and probing pocket depth from  $4.28 \pm 0.23$  to  $3.45 \pm 0.55$  after 30 days. Significant mean decrease was seen in both groups, however more reduction was seen in test group as compared to control group.

**Conclusion:** The diode laser used as an adjunct therapy to scaling and root planning helps in reduction of inflammation in the periodontal pockets and improves clinical parameters.

**Keywords:** Diode laser; Periodontal disease; Scaling and root planning

## INTRODUCTION

Periodontitis is a chronic inflammatory disease instigated by a bacterial infection. Thus, the bactericidal and detoxifying effects of laser treatment are advantageous in periodontal therapy. The effectiveness of this therapy involves suppressing certain bacteria associated with periodontal disease that cannot be treated readily with conventional scaling and root planing (SRP). As the bacteria is present on diseased root surfaces; as a result, it can invade the adjacent soft tissues as well, making removal by mechanical instrumentation difficult.<sup>1</sup> Recent research has proven that though bacteria are essential for periodontitis but most of the damage is done by inflammatory mediators and free radicals.<sup>2</sup> The anti-inflammatory and antibacterial properties of laser are desirable assets which validates its use in the treatment of periodontitis. The use of a dental laser in the treatment of Aggressive Periodontitis is based on the purported benefits of subgingival curettage, laser-induced new attachment through regen-

eration of cementum, periodontal ligament, and supporting alveolar bone, and significant decreases in subgingival pathogenic bacteria.<sup>3</sup> Hence the present study was planned and conducted to evaluate the efficacy of laser as adjunct to scaling and root planing.

## MATERIALS AND METHODS

Fifteen patients (8 males and 7 females) in the age group of 30-55 years, were selected randomly from the department of Periodontics who visited for the treatment of Aggressive periodontitis for the present randomised controlled study. After ethical approval from institutional ethical committee, a total of 30 sites were selected from fifteen patients. Two teeth were selected in each patient that readily bleeds on probing on the initial visit. Patients who have not undergone any form of periodontal surgical or non surgical periodontal therapy for the previous six months and were willing to take part in the study were selected after receiving informed consent for the study. Patients who were current smokers, had history of alcohol abuse, had systemic diseases such as diabetes, pregnant and nursing mothers were excluded from the study. Of the selected 30 sites, 15 were test sites (group A) which was followed with diode laser (980 nm) after scaling and root planning and 15 were control sites (group B) which were only treated with scaling and root planning. On the first day, patients were selected, target sites were identified and probing depth in target sites were measured. Prior to scaling and root planning at baseline, (day 1) the selected teeth with the site were subjected to assessment of gingival index, plaque index and probing pocket depth which was followed by full mouth scaling and root planning.

The hard tissue side of the pocket was first debrided with ultrasonic scalers and hand instruments. This was followed by laser bacterial reduction and coagulation of the soft tissue side of the pocket. The laser fiber was measured to a distance

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Group	Plaque index		p-value	Gingival index		p-value	probing pocket depth		p-value
	Mean± Standard Deviation			Mean± Standard Deviation			Mean± Standard Deviation		
	Day 1	Day 30		Day 1	Day 30		Day 1	Day 30	
Test group (Group A)	2.15±0.53	0.94±0.61	0.01	2.25±0.19	1.19±0.50	0.04	4.34±0.91	3.31±0.61	0.00
Control group (Group B)	2.08±0.67	1.21±0.56	0.03	2.89±0.65	1.94±0.36	0.05	4.28±0.23	3.45±0.55	0.45

**Table-1:** Summary of clinical parameters

of one mm short of the depth of the pocket. Methylene blue was used as a photosensitizer. The fiber was used in light contact with a sweeping motion that covers the entire epithelial lining, starting from the base of the pocket and moving upward. Patients were recalled after 1 week again for the second application of laser to the test site. The patients were then appointed to attend the dental clinic on the 30<sup>th</sup> day and plaque index, gingival index and probing pocket depth were assessed in control and test groups. Mean and standard deviation were estimated from the sample for each study group. Mean values were compared with Chi-square test. P value <0.05 was considered as the level of significance.

**RESULTS**

Analyzing the clinical parameters of aggressive Periodontitis patients, plaque index showed significant reduction in plaque scores (p<0.05). In group A reduction in plaque scores was observed from 2.15±0.53 at baseline to 0.94± 0.61 at 30 days, and group B from 2.08±0.67 at baseline to 1.21±0.56 at 30 days. Gingival index in group A reduction was observed from 2.25±0.19 at baseline to 1.19± 0.50 at 30 days, and group B from 2.89±0.65 at baseline to 1.94±0.36 at 30 days. Analyzing the probing pocket depth, in group A reduction was observed from 4.34±0.91 at baseline to 3.31± 0.61 at 30 days and group B from 4.28±0.23 at baseline to 3.45±0.55 at 30 days. Significant mean decrease was seen in both groups, however more reduction was seen in test group as compare to control group (table 1).

**DISCUSSION**

The practice of periodontology involves a variety of treatment approaches of which scaling and root planing remain the gold standard. However the use of local adjunctive therapeutic agents along with scaling and root planing has shown positive results as compared to scaling and root planing alone.<sup>4</sup>

This study was carried out to assess the efficacy of diode laser 810 nm as an adjunct to scaling and root planing. All the 15 subjects with 30 test sites were followed for 30 days. The clinical parameters for assessing changes in periodontal tissue were evaluated and more significant improvement was seen in the test group as compare to control group from baseline to 30th day. Kamma JJ et al<sup>5</sup> compared the effect of scaling and root planing alone, diode laser treatment alone and SRP combined with LAS in aggressive Periodontitis patients to evaluate clinical and microbial parameters and demonstrated that, diode laser-assisted treatment with SRP showed a superior effect over SRP or LAS alone for certain

microbial and clinical parameters in patients with aggressive periodontitis over the 6month monitoring period. Kusek ER et al<sup>1</sup> carried out a five-year retrospective study involving a diode dental laser used on periodontally infected teeth and reported that use of a diode laser 80% of the pockets treated using the diode laser were restored to a healthy pocket depth of 3 mm. Zare D et al<sup>6</sup> evaluated diode laser (980 nm) effect on gingival inflammation and found more reduction in tooth mobility and probing depth which could be attributed to the removal of lining epithelium of periodontal pocket and improvement of connective tissue attachment.

Castro GL et al<sup>7</sup> evaluated in vivo effects of scaling and root planing associated with 980-nm diode laser irradiation on periodontally diseased root surfaces and reported that associated therapy was suitable for non-surgical periodontal treatment and suggested that the diode laser may be routinely used as an adjunct to scaling and root planing without damage to the cementum tissue. Borrajo JL et al<sup>8</sup> evaluated clinical efficacy of diode laser as adjunct to traditional scaling and root planning and found moderate clinical improvement over traditional treatment method.

Lasers in periodontal therapy have been demonstrated to be beneficial for control of bacteremia, better removal of the pocket epithelium in the pockets, bacteria reduction, efficient subgingival calculus and improvement of periodontal regeneration in animals and humans without damaging the surrounding bone and pulp.<sup>9</sup>

Laser biostimulation normalizes cell function and promotes healing and repair. Secondary effects include increased lymphatic flow, increased microcirculation, production of endorphins, increased collagen formation and stimulation of fibroblasts, osteoblasts and odontoblasts. This stimulates the immune response, pain relief and wound healing.<sup>10</sup>

**CONCLUSION**

The diode laser used as an adjunct therapy to scaling and root planning helps in reduction of inflammation in the periodontal pockets and improves clinical parameters. Pocket depths found to be reduced more in the laser group than in the control group. Thus, the diode laser therapy, in combination with scaling, supports healing of the periodontal pockets through eliminating bacteria.

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# Status of Sensorineural Hearing Loss in Chronic Suppurative Otitis Media Patients

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## ABSTRACT

**Introduction:** This study titled “status of sensorineural hearing loss in chronic suppurative otitis media” was conducted on 77 patients presented with unilateral chronic suppurative otitis media. Aim of the study was to observe the incidence and pattern of sensorineural hearing loss in unilateral chronic suppurative otitis media.

**Material and methods:** The mean bone conduction (BC) threshold, low frequency averages (500 Hz, 1000 Hz and 2000 Hz) and high frequency averages (3000 Hz, 4000 Hz and 6000 Hz) of the diseased ear were compared. Bone conduction thresholds were obtained after adequate contralateral masking. The demographic and clinical profile were correlated with the bone conduction thresholds.

**Results:** Chronic suppurative otitis media is a disease of younger age group; maximum patients (57.14) were from younger age group. No significant gender difference (male 49.35% and female 50.65%) in the disease process of chronic suppurative otitis media. Chronic suppurative otitis media has basic triad of poverty, crowding and malnutrition in the genesis of disease process. Most patients present early, 51.59% patients with duration of discharge 0-5 years. Subjective hearing loss was most common complaints of chronic suppurative otitis media other than discharge. Maximum 62.34% patients found with subjective hearing loss. Higher frequencies are more affected and had higher degree of bone conduction thresholds.

**Conclusions:** It was found that among 77 patients studied, 26 patients presented with low frequency bone conduction loss and 47 patients were found with high frequency bone conduction loss. Higher frequencies are more affected and had higher degree of bone conduction thresholds.

**Keywords:** Sensorineural Hearing Loss; Chronic Suppurative Otitis Media; Bone Conduction Threshold; Ear Discharge.

through the external, middle and the inner ears while Bone conduction thresholds show hearing sensitivity measured by primarily through the inner ear. Air conduction thresholds poorer than bone conduction thresholds, show there is abnormal transmission of sound at the level of the outer or the middle ear. The difference in the thresholds is termed as the air bone gap.

## Sensorineural hearing loss

Sensorineural hearing loss is due to failure in the cochlear transduction of mechanical energy from middle ear to electrical impulses in the vestibulo-cochlear nerve. Structural damage to the pathway leads the reduced transduction of mechanical energy to electrical energy resulting in a number of changes in cochlear functions including hearing loss.<sup>1</sup>

The audiometric configuration of a sensorineural loss varies from low frequency to high frequency depending on the location of the damaged hair cells.<sup>2</sup>

## Mixed hearing loss:

A hearing loss comprising both sensorineural and conductive components is termed as mixed hearing loss. A mixed hearing loss indicates that a disordered outer or middle ear attenuates the sound delivered to an impaired cochlea and/or poorly conducting nerve. Bone conduction thresholds reflects the degree and configuration of the sensorineural components of hearing loss. Airconduction thresholds reflects both the sensorineural loss and the additional conductive component.

Usually conductive hearing loss is seen in the patients of chronic suppurative otitis media, but sometimes in addition to conductive hearing loss, patients with unilateral chronic suppurative otitis media are found to have significantly greater hearing thresholds in the affected ear compared with the normal ear.<sup>3,4</sup> In cases of chronic suppurative otitis me-

## INTRODUCTION

Decrease in hearing sensitivity is due to an abnormal transmission of sound to the brain by a diseased ear. This decreased transmission of sound can result due to a number of reasons that affects the hearing mechanism.

### Conductive hearing loss

A conductive hearing loss is due to abnormal transmission of sound from outer to middle ear. A conductive loss is measured on the basis of air and bone conduction thresholds. Air conduction thresholds show hearing sensitivity as measured

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dia, sensorineural hearing loss is due to cochlear damage and higher frequencies are more affected.<sup>5</sup> Cochlear damage has been attributed to the diffusion of the toxic products of inflammation through the scala tympani via the round window membrane.<sup>6,7</sup> Aim of the research was to observe the incidence and pattern of sensorineural hearing loss in the unilateral chronic suppurative otitis media.

## MATERIAL AND METHODS

A prospective study was done for the period of one year.

### Study sample

Patients admitted in the department of otorhinolaryngology, Gandhi Memorial and associated Hospitals C.S.M. Medical University, Lucknow with unilateral chronic suppurative otitis media were undertaken for study. The mean bone conduction (BC) threshold, low frequencies averages (500, 1000 and 2000 Hz) and high frequencies averages (3000, 4000 and 6000 Hz) of diseased ear were compared with opposite ear considering the opposite ear to be normal in each patient. Bone conduction thresholds were obtained after adequate contralateral masking, using the same audiometer for all patients. The demographic and clinical profile were correlated with the bone conduction thresholds. This was again correlated with otological findings.

### Inclusion criteria

- Patients of age group 17-55 years
- Unilateral Chronic Suppurative Otitis Media (CSOM)
- Clinically normal opposite ear in each case

### Exclusion criteria

- Bilateral CSOM
- Previous ear surgery
- Mentally retarded
- Non co-operative patients
- Pre-senile dementia
- Patient suffering from systemic illness

### Clinical evaluation of patients

After admitting the patient all the particulars such as name, age, sex, occupation, address were noted. Detailed history including complete general as well as systemic examination was performed to rule out any systemic disorders. In ENT examination, patient was evaluated in terms of type, duration of discharge, site and size of perforation were noted. Tuning fork test along with pure tone audiometry was done. Aural swab examination was done in required cases.

## STATISTICAL ANALYSIS

Continuous data were summarized as Mean  $\pm$  SD (standard deviation) while discrete (categorical) in no and %. The categorical groups were compared by chi-square ( $\chi^2$ ) test. Pearson correlation analysis was used to assess association between the variables. A two-tailed ( $\alpha=2$ ) p value less than 0.05 ( $p<0.05$ ) was considered statistically significant. All analyses were performed on SPSS software (windows version 15.0).

## RESULTS

This study was conducted in patients admitted and operated as unilateral ear disease in department of otorhinolaryngology, Gandhi Memorial and Associated Hospitals, C. S. M. Medical University, Lucknow. Total of 77 patients were included in this study between age groups of 17 to 55 years (**Table 1**). Maximum 44 patients (57.14%) were recorded in the age group of 17 to 27 years. In our study unilateral ear disease was found in 49.35% male patients and in 50.65% female patients and 46.75% patients were from rural while 53.25% from urban areas.

In this study, based on the history of the patients, maximum 40 patients (51.95%) had duration of discharge for <5 years and 15 patients (19.48%) had duration of discharge for >20 years (**Table 2**). 66 (85.71%) patients presented with history of scanty discharge with either tubotympanic or atticofacial disease.

Mucoid discharge was present in 42 patients (54.55%) while 31 patients (40.26%) presented with mucopurulent discharge and 2 patients (2.60%) with blood stained discharge. There was odourless discharge in 43 patients (55.84%) and foul smelling in 34 patients (44.16%). All patients in this study, had history of intermittent discharge except 1 patient with tubotympanic disease who had continuous discharge from 3 month. In our study, we found 50 patients (64.94%) with tubotympanic disease and 27 patients (35.06%) with atticofacial disease.

In this study apart from ear discharge, subjective hearing loss was the complaint in 48(62.35%), otalgia in 12(15.58%), tinnitus in 14(18.18%) and dizziness in 5(6.49%) patients (**Table 3**).

Low frequency bone conduction thresholds were found deranged in 51 patients (66.23%) under 0-10 dB (**Table 4**) while high frequency bone conduction thresholds were found affected in 30 patients (42.96%) under 0-10 dB (**Table 5**).

## DISCUSSION

This study was conducted in patients presented with unilateral ear discharge in outdoor or indoor department of Otorhinolaryngology in Gandhi Memorial and Associated Hospi-

Age Group	Male	Female	Total	Percentage
17-27	24	20	44	57.14
28-37	12	13	25	32.47
38-47	1	6	7	9.09
48-57	1	0	1	1.3

**Table-1:** Age distribution in male and female

Duration of discharge (yrs.)	Number of patients	Percentage
0-5	40	51.95
6-10	13	16.88
11-15	9	11.69
16-20	0	0
>20	15	19.48

**Table-2:** Duration of discharge (yrs.)

Chief complaints	Male	%	Female	%	Total	%
Otalgia	7	58.33	5	41.67	12	15.58
Subjective hearing loss	29	60.42	19	39.58	48	62.34
Tinnitus	9	64.29	5	35.71	14	18.18
Dizziness	5	100	0	0	5	6.49

**Table-3:** Chief complaints other than discharge

Intensity interval (dB)	Number of patients	Percentage
0-5	21	27.27
6-10	30	38.96
11-15	14	18.18
16-20	4	5.19
21-25	5	6.49
26-30	2	2.60
31-35	1	1.30
36-40	0	0
41-45	0	0

**Table-4:** Low frequency bone conduction thresholds

Frequency interval (dB)	Number of patients	Percentage
0-5	9	15.69
6-10	21	27.27
11-15	13	16.88
16-20	16	20.78
21-25	6	7.79
26-30	5	6.49
31-35	1	1.30
36-40	2	2.60
41-45	4	5.19

**Table-5:** High frequency bone conduction thresholds

tals, C. S. M. Medical University, Lucknow.

Chronic suppurative otitis media has basic triad of poverty, crowding and malnutrition in the genesis of the disease process. Total 77 patients were included in this study between age groups of 17 to 55 years. Maximum 44 patients (57.14%) were recorded in the age group of 17 to 27 years. Since chronic suppurative otitis media is a disease of younger age group, maximum patients were from younger age group.

We found incidence of unilateral ear disease in males 49.35% and in females 50.65% suggesting no significance gender difference in the disease process of chronic suppurative otitis media. There was no significance sex difference in chronic suppurative otitis media in another study.<sup>8</sup>

In our study incidence of chronic suppurative otitis media in rural and urban population was found 46.75% and 53.25% respectively. Chronic suppurative otitis media has basic triad of poverty, crowding and malnutrition in the genesis of disease process, but patients in higher socioeconomic group being more inclined to seek medical advice.

The cardinal symptom of chronic suppurative otitis media is painless muco-purulent discharge and patients seeking medical advice for this troublesome ear discharge, so most patients presents early.<sup>9</sup> In our study 51.59% patients with duration of discharge 0-5 years. 19.48% patients had duration of discharge more than 20 years and most of these patients had complaints since their childhood and majority of

these patients were from rural population and presented to us when noticed troublesome complications of chronic suppurative otitis media other than discharge.

In our study, 54.55% patients presented to us with mucoid discharge; since maximum patients (64.94%) had tubotympanic disease. 40.26% patients had mucopurulent discharge and 2.60% patients with blood stained discharge. Mucopurulent discharge was found in 40.26% and 74.19% of them had atticofacial disease and 90.50% patients with mucoid discharge had tubotympanic disease.

In our study, 64.94% patients with tubotympanic disease and 35.06% patients with atticofacial disease, sex distribution was 77.77% males with atticofacial disease and 34.00% with tubotympanic disease. In females atticofacial disease 22.22% and tubotympanic disease 66.00%. There is no statistical difference between sensorineural deafness produced by unsafe type of chronic suppurative otitis media. In other words, 'safe' type chronic suppurative otitis media is not safe with respect to hearing.<sup>10</sup>

55.84% patients had odourless discharge and 44.16% patients had foul smelling discharge. 88.38% patients with foul smelling discharge had atticofacial disease and 64.71% patients with odourless discharge had tubotympanic disease.

All patients in our study had intermittent discharge except one patient with tubotympanic disease had history of continuous discharge since 3 month duration. Subjective hearing loss was most common complaint of chronic otitis media other than discharge. In our study, we found maximum 62.34% patient with subjective hearing loss, otalgia in 15.58%, tinnitus in 18.18% and dizziness in 6.49% patients. Since the main sequel caused by chronic suppurative otitis media is hearing loss that's why maximum patient had subjective hearing loss.

Low frequency bone conduction thresholds were found in 66.23% cases in group-I (<10dB) and in 33.77% cases in group-II (>10dB) while high frequency bone conduction thresholds were found in 42.96% cases in group-I (<10dB) and in 57.04% cases in group-II (>10dB).

Thus in our study high frequency bone conduction thresholds were found elevated more than 10 dB in 57.04% compare to low frequency bone conduction thresholds 33.77%, so higher frequencies are more affected and had higher degree of bone conduction thresholds.

Similar findings were quoted in a previous studies wherein authors stated that higher frequencies are easier affected than lower frequencies.<sup>11</sup>

## CONCLUSION

Chronic suppurative otitis media is a disease of younger age group. There is no significance gender difference in the

disease process and it has basic triad of poverty, crowding and mal-nutrition in the genesis of the disease process. Ear discharge is the most common complaints in these patients followed by hearing loss. Though there is mostly conductive hearing loss but the patients of chronic suppurative otitis media patient may have some degree of low and high frequency bone conduction loss. Higher frequencies are affected more and have higher degree of bone conduction thresholds. Safe type of chronic otitis media is not safe with respect to bone conduction.

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# Sociodemographic Profile of Patients with Conversion Disorder –A Study from Kashmir

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## ABSTRACT

**Introduction:** Conversion disorder receives its name from the “conversion” of anxiety into a physical symptom. The conversion symptom protects the individual from experiencing painful feelings associated with a psychological conflict by keeping the conflict unconscious and simultaneously transforms the same into a somatic symptom that allows the individual to receive a benefit or avoid a particular activity. Objective of the study was to study various sociodemographic characteristics of patients with conversion disorder in Kashmir.

**Material and Methods:** Patients with conversion disorder of age more than 10 years were diagnosed according to DSM-IV-TR criteria and their sociodemographic characteristics were noted by using Kuppaswamy's scale. Data was presented in percentages and chi square was used.

**Results:** The study findings revealed that females are suffering more with conversion disorders as compared to males. Conversion disorder was reported more by patients in the age group of 10-25years, married, unemployed, illiterates, of higher birth order, belonging to poor socioeconomic status, of nuclear families, with poor social support, and residing in rural areas.

**Conclusion:** Conversion disorder has association with different sociodemographic variables. Social support was also found as important factor in conversion. There is need to prevent the occurrence of conversion disorder in Kashmir by dealing with few such factors like unemployment and illiteracy and to build functional social support.

**Keywords:** conversion disorder, Sociodemographic, Kashmir.

## INTRODUCTION

Conversion disorder is defined as an illness of symptoms or deficits that affect motor or sensory functions which are not intentionally produced, not due to substance use, not limited to pain or sexual symptoms, suggest another medical condition but is caused by psychological factors preceding the illness and gain is primarily psychological but not social, monetary, or legal.<sup>1</sup> The term conversion was first used by Freud and Breuer to refer to the substitution of a somatic symptom for a repressed idea (Freud, 1894). This behaviour exemplifies the psychological concept of ‘primary gain’, i.e. psychological anxiety is converted into somatic symptomatology, which lessens the anxiety and gives rise to la belle indifference, where a patient seems surprisingly unconcerned about their physical symptoms. The ‘secondary gain’ of such a reaction is the subsequent benefit that a patient may derive from being in the sick role.<sup>2</sup> Conversion disorder is common in our setting. The studies regarding conversion disorder are yet not reported from Kashmir. For this reason, this study

was planned to determine Sociodemographic characteristics of patients suffering from conversion disorder.

## MATERIAL AND METHODS

The present study was carried in the Community General Hospital Unit, IMHANS-Kashmir, an associated Hospital of Government Medical College Srinagar from April 2015 to October 2015 after getting approval from ethical committee of Govt. Medical College Srinagar. It was a cross-sectional study. Consecutive patients, attending Community General Hospital Unit, IMHANS-Kashmir, after being diagnosed as conversion disorder by Consultant Psychiatrist according to DSM-IV-TR Criteria and fulfilling the inclusion criteria were included in the study after taking full written informed consent in the language understandable to the them, and those who were considered incapable of consenting participated in the study with the consent of their closest family member or legal guardian and ascent from child had been taken. Patients were informed about the purpose of the interviewing. Sociodemographic characters were noted for each patient such as age, gender, employment, education, marital status and socioeconomic status. Socio-economic status was determined using the Kuppaswamy's Scale.<sup>3</sup> This Scale was developed for use in India and has been used extensively in hospital and community based research in India. This scale takes account of education, occupation and income of the family to classify study groups. Total of 115 patients were recruited in the study. Patients who were diagnosed as conversion disorder according to DSM-IV-TR Criteria, aged greater than 10yrs of both sexes were included in the study. Patients who had organic brain disorders/ endocrinopathies/ severe medical problems and had severe to profound mental retardation were excluded from the study.

## STATISTICAL ANALYSIS

Data was described by using Descriptive Statistics like frequency distribution and in percentages. Further, chi-square

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goodness of fit test was used to find significant differences across different socio-demographic variables and difference was taken significant at P value of 0.05.

## RESULTS

A total of 115 patients diagnosed with conversion disorder (DSM-IV-TR) were studied between April 2015 to October 2015.

From the table it is clear that out of 115 patients, 84 were females (73.04%), and 31 were males (26.95%) (Female: Male= 2.7:1). The difference was found to be statistically significant ( $p=0.0001$ ). Total of 84 (73.04%) were married, 28 (24.34%) were unmarried and remaining 3 were divorced/separated/widowed ( $p=0.0001$ ). 57.39% belong to the age group of >10-25years, 22.60% (26-40years), 14.78% (41-55years) and 5.21% (>55years) ( $p=0.0001$ ). Majority club in the birth order of 2, 3, &>4 (28.69%, 29.56%, 26.08% respectively ( $p=0.13$ )). 59.13% were from rural background ( $p=0.05$ ), 65.21% were illiterates, 70.43% were unemployed with only 8.69% as semi-professional, majority belonging to class-IV (68.69%), and 20.86% belong to

class-V ( $p=0.0001$ ). 88.69% were from nuclear family and most had poor social support (72.17%), the difference was statistically significant ( $p=0.0001$ ).

## DISCUSSION

The aim of the present study was to study various sociodemographic characteristics of patients with conversion disorder in Kashmir. The present study findings revealed that females are suffering more with conversion disorders as compared to male with male:female ratio of 1:2.7. Such finding has consistently been reported in past studies in which prevalence of conversion disorder was predominant in female.<sup>4-6</sup> Among different age groups, this disorder was more often reported in the age group of 10-25 years of age (57.39%). Similar findings were reported by Ranjan and Pramod (2010) in their study where majority of the patients (84.5 %) were less than 30 years of age. Similar studies conducted in Saudi Arabia reported majority of patients having less than thirty years of age.<sup>7,8</sup> Patients were more often found to be illiterate (65.21%). Jain et al confirmed the finding in their study in which they found that illness occurred in all education-

Sociodemographic data	Groups	% (N)	Chi-square value	p-value
Sex	Males	26.95% (N=31)	24.43	0.0001
	Females	73.04% (N=84)		
Marital status	Married	73.04% (N=84)	89.76	0.0001
	Unmarried	24.34% (N=28)		
	Others (separated/divorced/widowed)	2.60% (N=3)		
Age group	10-25 Years	57.39% (N=66)	71.33	0.0001
	26-40 Years	22.60% (N=26)		
	41-55 Years	14.78% (N=17)		
	>55 Years	5.21% (N=6)		
Birth order	1	15.65% (N=18)	5.66	0.13
	2	28.69% (N=33)		
	3	29.56% (N=34)		
	>4	26.08% (N=30)		
Residential background	Rural	59.13% (N=68)	3.83	0.05
	Urban	40.87% (N=47)		
Occupation	Student	17.39% (N=20)	131.16	0.0001
	Semi-professional	8.69% (N=10)		
	Business	3.47% (N=4)		
	Unemployed	70.43% (N=81)		
Education	Illiterate	65.21% (N=75)	104.03	0.0001
	Primary/middle school	17.39% (N=20)		
	High/higher-sec school	13.91% (N=16)		
	Graduation/post- graduation	3.48% (N=4)		
Socio-economic status	Class I	1.73% (N=2)	183.82	0.0001
	Class II	3.47% (N=4)		
	Class III	5.21% (N=6)		
	Class IV	68.69% (N=79)		
	Class V	20.86% (N=24)		
Type of family	Nuclear	88.69% (N=102)	68.87	0.0001
	Joint	11.30% (N=13)		
Social support	Minimal	72.17% (N=83)	80.63	0.0001
	Good	20% (N=23)		
	Fair	7.82% (N=9)		

**Table-1:** sociodemographic characteristics of patients with conversion disorder

al groups, still the illiterate predominated over all others (43.9%).<sup>9</sup> It was further seen in our study that such patients were more unemployed and were belonging to poor socioeconomic class. Similar results were reported by most studies which show that conversion symptoms are commonly seen in poorly educated people of low socioeconomic status.<sup>10-12</sup> One possible reason is their poor means of coping with precipitating life events and sickness might become the most feasible way of gaining relief from emotional strain.<sup>13</sup> Majority (73.04%) of the patients were married and the difference was found significant when compared to unmarried. This is consistent with the findings by Choudhury *et al.*<sup>14</sup> and Jain and Verma *et al.*<sup>15</sup> who found housewives and married to be the predominant group. Married people in Kashmir get more exposed to life event stressors which enhances their chances of having conversion. All these findings are further supported by many other studies.<sup>16,17</sup> More patients (59.13%) were from rural background as compared to urban though the difference was statistically insignificant. The finding is consistent with the result of Deka *et al.* study in which they found majority of the subjects had a rural background.<sup>18</sup> The high occurrence of conversion in rural areas is possibly due to high political turmoil and its effects on rural people in Kashmir and also majority of people reside in rural areas. Majority of patients belonged to nuclear families. Deka *et al.* also reported similar results in which they found 82.5% of the study population were from nuclear families and attributed it with life-style pattern changing to a modernized one.<sup>18</sup> One more common reason is lack of social support in such families as our study also revealed that conversion was more commonly seen in people with poor social support. Kulhara and Chopra reported negative correlation between social support and dysfunction which suggest that lack of supportive relationships makes an individual even more vulnerable.<sup>19</sup>

## CONCLUSION

From the present study it could be revealed that females outnumbered males. The most affected age group in our study was from 10 -25 years of age. So far as educational status is concerned majority were from the illiterate (65.21%) group. More patients were from poor socioeconomic group and being unemployed. Majority of the patients were married and from rural background.

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# Clinicopathological Evaluation of Lymph Node Lesions by Fine Needle Aspiration Cytology

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## ABSTRACT

**Introduction:** Fine Needle Aspiration Cytology (FNAC) is a simple, quick and inexpensive method that is used to sample enlarged lymph nodes and is usually performed as an outdoor procedure. It causes minimal trauma to the patient and carries virtually no risk of complications. The objective of this descriptive study was to analyse the various cytomorphological patterns on FNAC in peripheral lymphadenopathy patients along with their clinical presentation.

**Materials and Methods:** The present study included 200 patients of peripheral lymphadenopathy in a tertiary care hospital. FNAC was done under all aseptic conditions and various cytomorphological patterns were analysed.

**Results:** On stratification of lymph node lesions, 110/200 cases (55.0%) were reported as neoplastic and 90/200 cases (45.0%) as non-neoplastic lesions. Metastatic involvement of lymph node was the commonest pathological finding diagnosed in 96/110 of malignant neoplastic cases (87.3%). Among the non-neoplastic lesions, reactive lymphoid hyperplasia was the commonest lesion encountered in 47 cases (52.2%), followed by granulomatous pathology and suppurative lymphadenitis. Overall, the cervical lymph nodes were most commonly involved in 59.5% patients, followed by other lymph nodes.

**Conclusion:** FNAC as a first line investigative procedure in lymphadenopathy patients obviates the need for surgical excision and guides subsequent patient therapy and management. The cervical group of lymph nodes are most commonly involved in both non neoplastic as well as neoplastic lymph node lesions. In younger age group (<20 years) non neoplastic causes of lymphadenopathy are more common whereas in elderly the malignant neoplastic causes are more common. The secondary metastatic carcinoma is more common than primary lymphoma of the lymph nodes.

**Keywords:** Fine needle aspiration cytology, lymphadenopathy, metastasis, granuloma.

## INTRODUCTION

Lymphadenopathy is one of the commonest clinical presentations of all age group patients coming to the outpatient departments. Lymph nodes react to a variety of microorganisms and non-specific stimuli by expansion of the follicle centres and/or interfollicular tissue. This results in enlargement of the nodes which may be considerable. The etiological factors of lymphadenopathy in adults are likely to be different from that in children. Children can present with massive local lymphadenopathy even after mild infections. In contrast, adults or elderly patients often react to infections with only slight to modest lymph node enlargement. Therefore, distinct lymphadenopathy in an elderly patient will

raise suspicion of malignancy.<sup>1</sup> On the other hand, in second and third decade of life, granulomatous lymphadenitis is a common cause of lymphadenopathy. Thus, etiology can vary from a reactive process to a granulomatous etiology to a malignant condition.<sup>2</sup>

FNAC is a sensitive, safe, speedy, reliable, cost-effective OPD procedure that has a lower risk of complications as compared to a surgical biopsy. Surgical excision is considerably expensive, time consuming and delays appropriate early management.<sup>3</sup> With FNAC results are obtained within few hours and if required the procedure can be repeated with wide patient acceptance as it is relatively atraumatic and does not leave a scar.<sup>4-7</sup>

The cytomorphological features obtained in needle aspiration, usually correlate very well with the histological features. Using cytomorphology alone, it is often possible to decide whether lymphadenopathy has resulted from reactive lymphadenitis, granulomatous pathology, acute suppurative etiology, metastatic malignancy or lymphoma. Patients with reactive lymphadenopathy and metastasis from a known malignancy can thus be spared lymph node excision. In cases with indeterminate cytology or diagnosis of lymphoma, surgical excision has usually been regarded as mandatory. However, several recent studies have shown conclusively that a combined cytological and immunological evaluation of aspirated lymphoid cells results in distinctly improved diagnostic accuracy in cases of lymphoma. Aspirated cells perform excellently in immunohistochemistry, flowcytometry and gene rearrangement analysis.<sup>1,8</sup>

In cases of reactive lymphadenopathy, FNAC has made the diagnosis easier and the number of surgical biopsies has been reduced. The causative organisms can be identified with FNAC in infectious etiology cases. In cases of malignancies, it not only confirms the presence of metastatic disease but also gives clue regarding the nature and site of the primary tumour.<sup>9</sup> It also helps in staging, diagnosing recurrences and progression of low grade lymphomas.<sup>10</sup> Thus, FNAC is helpful in preparing and monitoring treatment plans for the patients with lymph node lesions.<sup>11</sup>

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According to various preliminary reports, the Malwa belt of Punjab has an increasing incidence of cancer so this study was planned to evaluate the cytomorphological patterns in lymphadenopathy by fine needle aspiration.

## MATERIALS AND METHODS

The present study included 200 patients of peripheral lymphadenopathy in a tertiary care hospital of Malwa region of Punjab. All the patients were clinically examined and the procedure of FNAC was explained to them including reliability, limitations and complications of the procedure. Informed consent of the patients was taken. FNA procedure, smear preparation and staining were done as per the standard procedure. The smears were stained with May Grunwald Giemsa, Haematoxylin and Eosin and Papanicolaou stain. Special staining like Ziehl Neelsen stain was performed for the detection of acid fast bacilli, wherever required. Smears were examined microscopically for evaluating the cytological findings in all the cases.

## RESULTS

The age range of the patients was from 1 to 90 years with a mean age of 43.71 years. The male:female ratio was 1:1.1. The non neoplastic lymph node lesions were more in females as compared to males with the male:female ratio of 1:1.9, whereas the neoplastic lymph node lesions were more in males as compared to females with the male:female ratio of 1.4:1.

In the present study, 191 patients (95.5%) had localised lymphadenopathy whereas 9 cases (4.5%) had involvement of multiple groups of lymph nodes. The cervical group of lymph node was the commonest site in 119 cases (59.5%), followed by supraclavicular in 25 cases (12.5%), axillary in 19 cases (9.5%) and inguinal group in 15 cases (7.5%). Submandibular group was involved in 6 cases (3.0%), submental in 4 cases (2.0%), preauricular in 2 cases (1.0%) and postauricular group in 1 case (0.5%) respectively.

The patients in the study presented with a broad range of signs and symptoms with a history of fever in 37 cases (18.5%), loss of appetite in 36 cases (18.0%), cough in 25 cases (12.5%) and 40 cases (20.0%) were already known case of malignancy. Hoarseness of voice was present in 13 cases (6.5%), breathlessness in 10 cases (5.0%), sore throat in 6 cases (3.0%) and history of dysphagia in 5 cases (2.5%). 12 patients (6.0%) had associated lump breast, 8 patients (4.0%) had hepatomegaly, 4 patients (2.0%) had splenomegaly and 1 patient (0.5%) presented with prostatomegaly.

It was observed that 110/200 cases (55.0%) were of malignant neoplastic lymph node lesions and 90/200 cases (45.0%) were of non neoplastic lesions. In the malignant neoplastic lesions secondary malignancy (metastatic involvement) of lymph node was more common pathological finding in 96/110 cases (87.3%) whereas primary malignancy (lymphoma) was diagnosed in 14/110 cases (12.7%).

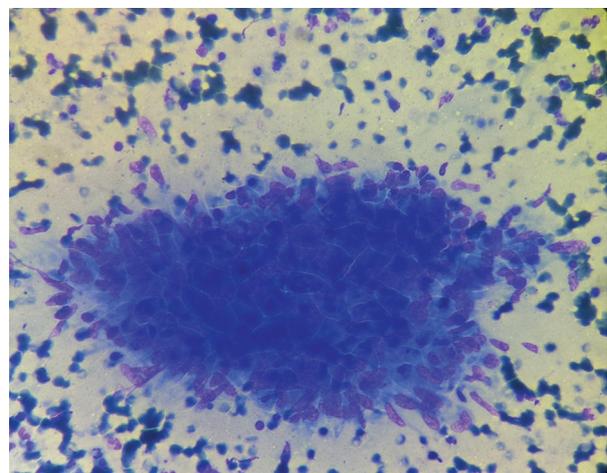
Reactive lymphadenitis was the commonest lesions encountered among non neoplastic lesions with 47/90 cases (52.2%)

followed by granulomatous lymphadenitis (Fig 1) in 34/90 cases (37.8%) and suppurative lymphadenitis in 9/90 cases (10.0%). The study revealed highest incidence of reactive lymphoid hyperplasia in first and second decade of life. Patients reported as reactive lymphoid hyperplasia presented with a wide spectrum of clinical symptoms; most common complaints were fever, cough and pain.

It was observed that the cases of suppurative pathology were evenly distributed in all the age groups and all these patients had localised lymphadenopathy. Most of the cases reported as granulomatous pathology were in the second and third decade of life. The mean age of involvement was 26.58 years. It was noticed that majority i.e. 26/34 cases (76.5%) of granulomatous pathology involved cervical group of lymph nodes whereas submental group of lymph nodes were involved in 3/34 cases (8.8%) and axillary in 2/34 cases (5.8%). Out of 34 cases of granulomatous disease, in 10 cases (29.5%) multinucleate giant cells were also seen and 10 cases (29.5%) had necrosis in the background. On Ziehl Neelsen staining, acid fast bacilli (AFB) were seen in 18 (52.9%) cases.

The majority of the cases of Non-Hodgkin Lymphoma (61.5%) were seen in >50 years of age group and males were affected more commonly with male:female ratio of 1.6:1. Cervical group of lymph nodes were involved in majority i.e. 9 cases (69.2%) and multiple groups of lymph nodes were involved in 4 cases (30.8%). The loss of appetite, fever and hepatosplenomegaly were the common clinical signs and symptoms of patients with Non-Hodgkin Lymphoma. A single case of Hodgkin Lymphoma was observed. This patient of Hodgkin lymphoma was a 12 year female child with enlarged rubbery lymph nodes in the cervical region.

It was noticed that most of the patients with metastatic lymph node lesions were above 40 years of age with male:female ratio of 1.4:1. Cervical group of lymph node involvement was seen in 43/96 cases (44.8%), followed by 20 cases (20.8%) of supraclavicular, 15 cases (15.6%) of axillary and 11 cases (11.5%) of inguinal group of lymph node involvement. The patients presented with a wide range of symptoms depending on the site of primary malignancy. 16 patients (16.7%) presented with a chief complaint of loss of appetite, 12 cases



**Figure-1:** Photomicrograph showing epithelioid cell granuloma in case of granulomatous lymphadenitis (MGG, 400X).

(12.5%) with hoarseness of voice and 12 cases (12.5%) with a lump breast. 11 cases (11.5%) had a complaint of cough, 9 cases (9.4%) had breathlessness, 5 cases (5.1%) had fever, 4 cases (4.2%) had SOL lung and 3 cases (3.1%) had dysphagia. The study revealed that out of 96 cases of metastasis, 46 cases (47.9%) were of squamous cell carcinoma (Fig 2), 22 cases (22.9%) of infiltrating ductal carcinoma breast, 10 cases (10.4%) of adenocarcinoma, NOS, 2 cases (2.1%) each of small cell carcinoma and nasopharyngeal carcinoma, 1 case (1.04%) each of carcinoma ex pleomorphic adenoma, papillary adenocarcinoma ovary and transitional cell carcinoma. However, 11 cases (11.46%) cases could not be subtyped based on cytomorphology.

**DISCUSSION**

Lymphadenopathy is a common clinical finding; it may be a sign of inflammation, metastatic malignancy or malignant lymphoma. Fine needle aspiration in the investigation of lymphadenopathy has become a standard and frequently practiced invasive technique.<sup>12,13</sup> Because of early availability or results, simplicity, minimal trauma and complication, the aspiration cytology is now considered as a valuable diagnostic aid and it provides ease in following patients with known malignancy and ready identification of metastasis or recurrence.<sup>14</sup>

In the present study age range of the patients was quite wide from 1 to 90 years indicating that lymphadenopathy is a common clinical presentation in all age groups. The mean age of the patients was 43.71 years with male: female ratio of 1:1.1. The cervical region is usually the commonest

site of enlarged lymph nodes.<sup>15,16</sup> In this study also maximum (59.5%) patients presented with cervical lymphadenopathy followed by supraclavicular, axillary and inguinal. On stratification of lymphadenopathy cases it was observed that neoplastic malignant cases (55%) were more common than the non neoplastic cases (45%). The ratio of non-neoplastic:neoplastic lesions was 1:1.22. As compared to the other studies (Table 1) this ratio was altered and was in favour of malignant neoplastic lesions indicating the high incidence of malignant cases in this region.<sup>15,17-19</sup> However, it may be because of more number of malignant referral cases coming to our tertiary care hospital for treatment.

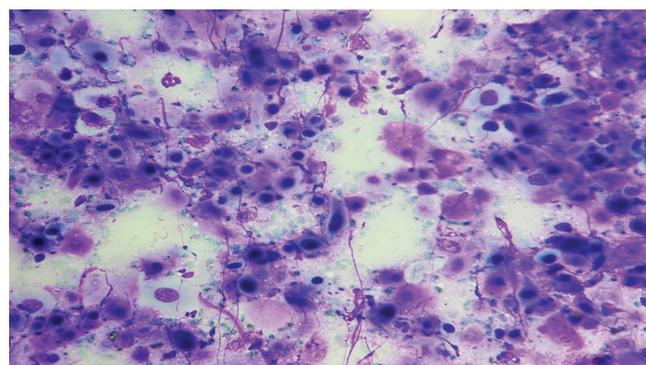
In the present study, among non neoplastic lesions, maximum number of cases (23.5%) were of reactive lymphoid hyperplasia, followed by 17.0% cases of granulomatous pathology and 4.5% cases of suppurative lymphadenitis. A comparative evaluation of these results has been done and shown in table 2.<sup>15,16,20,21</sup>

The granulomatous pathology occurs because of a number of infectious and non infectious causes. The common infectious causes include tuberculosis, atypical mycobacteriosis, fungal infections, toxoplasmosis, cat scratch disease, tularaemia and leprosy. The common non infectious causes include chronic granulomatous disease, sarcoidosis and foreign body granuloma. 34/200 (17%) cases in the present study had granulomatous pathology and 52.9% (18/34) of these patients revealed presence of acid fast bacilli on Ziehl Neelsen staining confirming the diagnosis of tubercular lymphadenitis. Most of the patients of granulomatous pathology were in the second and third decade of life. Patients of suppurative lymphadenitis presented with pain, tenderness and fever and responded well with antibiotic treatment.

The lymphoma patients usually present with severe anorexia, loss of weight and fever along with the presence of hepatos-

Sr No	Study	Non-neoplastic lesions	Neoplastic lesions	Ratio
1	Dash et al <sup>17</sup> (1996) n- 472	410(86.14%)	66(13.86%)	6.21:1
2	Nada A et al <sup>18</sup> (1996) n-150	83(55.30%)	67(44.70%)	1.24:1
3	Shamshad et al <sup>19</sup> (2005) n-1000	864(86.40%)	136(13.60%)	6.35:1
4	Hirachand et al <sup>15</sup> (2009) n-130	106(81.70%)	24(18.30%)	4.42:1
5	Present study n-200	90(45.00%)	110(55.00%)	1:1.22

**Table-1:** Showing comparative evaluation of non-neoplastic and neoplastic lesions in different studies



**Figure-2:** Photomicrograph showing metastatic squamous cell carcinoma (MGG, 400X).

Sr No	Lymph node lesions	Bottle et al <sup>20</sup> (1988)	Hirachand et al <sup>15</sup> (2009)	Ruchi et al <sup>21</sup> (2006)	Guru et al <sup>16</sup> (2009)	Present study
1	Reactive lymphoid hyperplasia	50.00%	41.50%	37.20%	46.32%	23.50%
2	Granulomatous pathology	17.00%	37.20%	52.30%	48.85%	17.00%
3	Suppurative lymphadenitis	-	03.00%	01.00%	01.29%	04.50%
4	Metastatic carcinoma	12.30%	12.30%	03.80%	01.29%	48.00%
5	Lymphoma	06.00%	06.00%	02.00%	01.73%	07.00%

**Table-2:** Showing comparative evaluation of cytological diagnosis of lymphadenopathy in different studies

plénomegaly in some of these. 13/14 lymphoma cases in this study were having Non Hodgkin's lymphoma and a single case of Hodgkin Lymphoma was observed. Hypocellular aspirates from clinically significant/large lymph nodes should alert the pathologist to the possibility of fibrosis obscuring the primary pathology. The biopsy is mandatory in such cases. The presence of atypical mononuclear cells, large number of eosinophils and granulomas together should raise a high index of suspicion for further evaluation.

The most common cause of malignant neoplastic lesions in the present study was metastatic carcinomatous deposits in 48% of total cases followed by lymphoma in 7% cases. It was observed that 22 patients (22.9%) had primary lesion in the breast, 13 patients (13.5%) in larynx and pharynx, 8 patients (8.3%) in lung, 4 patients (4.2%) in cervix, 3 patients (3.1%) in anal canal, 2 patients (2.1%) each in esophagus and lip and 1 patient (1.04%) in tongue, ovary, gall bladder, pancreas, testes, penis, prostate, salivary gland and urinary bladder. FNAC helped to find out the site of primary tumor in 45 (46.88%) cases with the help of clinicoradiological findings. This is the most valuable contribution of FNAC in timely management of malignant cases.

The incidence of malignancy increases steadily with the age of the patients and in this study 55.2% of reported cases were >50 years of age. No case of metastatic lymph node lesion was reported below 20 years of age. Hence, there is a pressing need for FNAC of enlarged lymph nodes in the elderly because of high chances of it to be malignant. Conversely, in younger age group (<20 years) non neoplastic causes of lymphadenopathy are more common and 53.2% of reactive lymphoid hyperplasia patients in this study were <20 years of age.<sup>22</sup>

## CONCLUSION

FNAC is simple, safe and cost effective investigative procedure that can be used as a first line investigation in diagnosis of lymphadenopathies. It helps in establishing the diagnosis in a large number of cases when used in conjunction with clinicoradiological findings, obviates the need for surgical excision and guides subsequent patient therapy and management. In first two decades of life reactive lymphoid hyperplasia is most common cause of lymphadenopathy whereas both NHL and metastatic carcinoma are seen mostly in patients over 40 years of age. Secondary metastatic carcinoma is more common malignant etiology of lymphadenopathy than primary lymphoma.

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# Comparative Study on Portobiliary Elements of Right Hemiliver Posterior Sector

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## ABSTRACT

**Introduction:** Intrahepatic anatomy of the liver is very complex to understand. This study was aimed at contributing to hepatobiliary practice, which means liver transplantation, resection or intervent right hemiliver surgery, portal vein ligation or embolization.

**Material and Methods:** Using injection-corrosive method 27 portobiliary casts out of 30 cadaveric liver specimens were made and analyzed. Under magnifying lens the portal vein branching patterns and biliary ducts merging patterns were analyzed and then compared at the level of right hemiliver posterior sector.

**Results:** The comparison has shown incomparable prevalence of portal and biliary anatomy as follows: main portal vein bifurcation in 88.89% and trifurcation in 11.11% of cases, in contrast to right hepatic duct present in 55.55% and absent in 44.44% of cases. Right portal vein branch conventional anatomy was observed in 59.26% of casts, and among them posterior portal vein branch conventional anatomy was observed in 29.63%. The plurality of the branches supplying segment 6 was found in a high percent of 51.85%. Comparison of ramification patterns of the posterior portal vein branch with merging patterns of the segmental ducts into posterior sector duct showed coincidence in 13/19 (68.42%) casts with modal type of merging into posterior sector duct and among the cases with different modalities of merging only in 2/8 (25%). In all levels of portobiliary branching there was only one specimen 1/27 (3.70%) with conventional anatomy in the right hemiliver.

**Conclusion:** Normal and variant portal vein anatomy may be accompanied with comparable or variant biliary anatomy.

**Keywords:** anatomy, biliary duct, liver, portal vein, right hemiliver posterior sector

## INTRODUCTION

Intrahepatic anatomy of the liver according to the ramification patterns of inflow and/or outflow vasculobiliary elements was investigated by the eminent anatomists Couinaud<sup>1-3</sup>, Gupta et al.<sup>4-7</sup> and as an integral part of the hepatopancreatobiliary clinical practice. Literature related to investigation of the functional anatomy of the liver and new knowledge of anatomical variations during modern diagnostic-therapeutic methods was used.<sup>8-15</sup> This applicable aspect of the liver anatomy was the leading motive to conduct this comparative study on portobiliary anatomy of the right hemiliver posterior sector.

## MATERIAL AND METHODS

A total of 30 cadaveric liver specimens were analyzed. After careful dissection of hilar area the injection-corrosive meth-

od was performed. The portal vein as a basic element of liver functional subdivision with uncoloured odontolitic acrylate was injected and then colored acrylate was injected into common hepatic duct. Such injected specimens were placed in concentrated HCl acid under corrosion for 5-7 days. The obtained portobiliary casts under magnifying lens were analyzed.

On 27/30 casts of proper quality the following was determined:

- I a) Presence or absence and branching patterns for: Main Portal Vein (MPV), Right Portal Vein Branch (RPVB) and Posterior Portal Vein Branch (PPVB)
- b) Frequency and origin of segment 7 and 6 portal branches
- II a) Biliary ducts-merging patterns
- b) Comparison of PPVB branching patterns and Posterior Sector Duct (PSD) merging patterns
- c) The site of junction of segmental ducts into PSD

## RESULTS

**I a) MPV:** Present in 27/27 cases.

MPV Branching Patterns:

Bifurcation into: LPVB and RPVB in 24/27 cases (88.89%); Cases marked as I, II, III, IV, V, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVIII, XX, XXI, XXII, XXIII, XXV, XXVI, XXVII and XXVIII.

Trifurcation into: a) LPVB, APVB and PPVB in 2/27 cases (7.41%); Cases marked as XXIV and XXIX, b) LPVB, APVB and Sg 7 PB in 1/27 cases (3.70%); Case marked as XXX.

**b) RPVB:** present in 24/27 cases (88.89%); absent in 3/27 cases (11.11%).

RPVB Branching Patterns:

Bifurcation into: a) APVB and PPVB in 16/27 cases (59.26%); Cases marked as I, II, V, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XX, XXII, XXVI and XXVII, b) APVB and Sg 7 PB in 2/27 cases (7.41%); Cases marked as XXV

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and XXVIII, c) Posterosuperior branch and Anteroinferior branch in 1/27 case (3.70%); Case marked as XXI. Trifurcation into: APVB, Sg 7 PB and Sg 6 PB in 3/27 cases (11.11%); Cases marked as VII, XVIII and XXIII. RPVB with arch-like appearance continue as APVB in 2/27 cases (7.41%); Cases marked as III and IV.

**PPVB:** present in 20/27 cases (74.1%); Cases marked as I, II, III, V, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XX, XXI, XXII, XXIV, XXVI, XXVII and XXIX, absent in 7/27 cases (25.9%); Cases marked as IV, VII, XVIII, XXIII, XXV, XXVIII and XXX.

PPVB Branching Patterns:

1. Simple bifurcation into: Sg 6 PB and Sg 7 PB in 8/27 cases (29.63%); Cases marked as I, III, XI, XIII, XIV, XV, XXVI and XXVII.
2. Continue as Sg 7 PB with arch-like appearance: a) Gave origin to Sg 6 PB in 6/27 cases (22.22%); Cases marked as II, V, X, XII, XX and XXIV, b) Gave origin to Sg 6 PBs and Sg 5 PBs in 2/27 cases (7.41%); Cases marked as IX and XVI.
3. Trifurcation into: a) Sg 7 PB, Sg 6 intermediate PB and Sg 6 main PB in 2/27 cases (7.41%); Cases marked as VIII and XXII, b) Sg 8 PB, Sg 7 PB and Sg 5 PB in 1/27 case (3.70%); Case marked as XXIX.
4. PPVB originating from RPVB as Posterosuperior branch gave origin to Sg 9, Sg 1, Sg (8+5), Sg 5 PBs and continued as Sg 7 PB in 1/27 case (3.70%); Case marked as XXI.

**I b) Segment 7 Portal Branch-**was a unique branch in all observed specimens 27/27 (100%).

It took origin from: PPVB in 21/27 cases (77.8%); RPVB in 4/27 cases (14.8%); APVB in 1/27 cases (3.70%) and MPV in 1/27 cases (3.70%).

**Segment 6 Portal Branch-**was present in variable number with different origin as follows:

Unique branch in 13/27 cases (48.15%); b) Two branches in 9/27 (33.33%); c) Three branches in 2/27 cases (7.41%) and

d) Four branches in 3/27 cases (11.11%).

As a unique branch originating from the main portal stems the following was observed:

From PPVB in 9/13 (69.23%); from RPVB in 3/13 (23.07%) and from APVB in 1/13 cases (7.7%).

In cases with two Sg 6 PBs took origin: from PPVB in 5/9 cases (55.55%), from PPVB and RPVB in 1/9 cases (11.11%); from Sg 7 PB in 1/9 cases (11.11%); from PPVB and APVB in 1/9 cases (11.11%) and from Sg 7 PB and RPVB in 1/9 cases (11.11%).

When there were three branches, they all took origin from PPVB-1/2 (50%) except in one case when two branches took origin from APVB and one from PT-1/2 (50%).

When there were four branches, they all took origin from PPVB in 1/3 cases (33.33%), then all branches from Sg 7 PB in 1/3 cases (33.33%) and the last one with three branches originated from Sg 7 PB and one branch from APVB in 1/3 (33.33%).

## II a) BILIARY DUCT-MERGING PATTERNS

From the total number of specimens in which the modal type of merging pattern of the segmental ducts (7+6) into PSD was found-19/27 (70.37%) cases marked as I, II, III, IV, V, VII, VIII, X, XII, XV, XVI, XX, XXIV, XXV, XXVI, XXVII, XXVIII, XXIX AND XXX, only 4 specimens were with equal numeric relationship 1/1 between segmental portal and biliary elements. This is shown in Table 1.

Analysis of biliary drainage in specimens with two ducts from Sg 7 showed that it was limited to Sg 7, but in three of them (specimens marked as I, XII and XXV) the drainage area of the second duct from Sg 7 was limited to vascular area of one collateral of Sg 7 PB. The confluence of the second duct was into Sg 6 duct (cases no. I and XXV) and into PSD (case no. XII). The remaining two cases (no. X and XVI) were with two segmental ducts along Sg 7 PB but the second duct was a tributary of PSD.

Analysis of biliary drainage of Sg 6 showed that except as constituent to PSD in cases with modal type of merging (7+6), in specimens with two segmental ducts from Sg 6 the participation of both or one duct into the forming of PSD

segment	Number of portal branches/number of segmental ducts							
	1/0	1/1	1/2	2/1	2/2	3/1	4/1	4/4
Sg 7 No. of cases	XXVI	II, III, IV, V, VII, VIII, XV, XX, XXIV, XXVII, XXVIII, XXIX, XXX	I, X, XII, XVI, XXV	Nil	Nil	Nil	Nil	Nil
Sg 6 No. of cases	Nil	I, II, III, VII, X, XXV, XXVI, XXVII	Nil	V, VIII	IV, XV, XVI, XXIV, XXX	XX	XXIX	XII, XX- VIII
Total	1	21	5	2	5	1	1	2

**Table-1:** Quantitative relationship of segmental portal and biliary elements destined to segments 7 and 6

was determined. The second duct was either the tributary of PSD or of ASD.

In the specimens with four ducts from Sg 6 the participation of all ducts in the forming of PSD was found or only one was a constituent duct and the remaining three were tributaries of PSD.

**II b)** Concerning the analyses of PPVB branching patterns and of PSD merging patterns for the mentioned 19 specimens the coincidence in the majority of them 13/19 (68.42%) was found on contrary to the cases with absent PPVB and present PSD 6/19 (31.58%).

For specimens with different modalities of merging of the segmental ducts into **PSD** the implication of more than two constituent ducts was found, especially when they came from drainage area of the neighboring segment, as follows:

- 7+(6+5) in specimen no. IX with comparable terminal ramification of PPVB
- 7+(7+6) in specimen no. XI with two ducts from Sg 7 and simple bifurcation of PPVB
- (7+7)+6 in specimen no. XIII with three Sg 7 ducts from which the last one was a tributary of PSD while PPVB simply divided into Sg 7 and 6 branches
- (7+6+5) in specimen no. XIV with second duct from Sg 7 which was a tributary of PSD and a simple bifurcation of PPVB
- (6+6) in specimen no. XVIII with one Sg 7 duct which was a tributary of PSD. On the contrary to the RPVB trifurcation into APVB, Sg 7 PB and Sg 6 PB a separate confluence of PSD and ASD on the opposite side was observed
- 7+[ (7+6)+5 ] in specimen no. XXIII with absent PPVB
- Prolongation of Sg 7 duct into PSD in specimen no. XXII with magistral way of confluence of 7, 9d, 6, 9b, 1 right portion with caudate process and 1 left portion with 9b segmental ducts. Contrary to the presence of RPVB and PPVB a separate confluence of PSD and ASD on the opposite side was observed
- Prolongation of Sg 7 duct into PSD and consequently into RHD in specimen no. XXI with magistral way of confluence of 7, 6, 5, 9, 1, 8+5 and 4b segmental ducts. The RPVB ending was comparable.

**II c)** Also, the site of junction of segmental ducts into PSD was determined and it was found to lay at these different levels:

1. **At the level of PPVB:** a) At the middle of anterior surface in specimens marked as I, V and XX; b) At the anterior surface of terminal bifurcation in specimens marked as IX, XII, XIV and XVI; c) At the anterior surface of terminal part in specimen marked as XXIV and d) Above the initial part of posterior border in specimen marked as XXVII.
2. **At the level of Sg 7 PB-**anterior surface of the initial part in specimens marked as II, III, VII, VIII, X, XIII, XV, XXII, XXIII, XXV, XXVI, XXVIII, XXIX and XXX.

3. **At the level of Sg 6 PB-**anterior surface of the initial part in specimens marked as IV and XVIII.
4. **At the level of APVB-**posterior surface of the beginning part in specimen marked as XI.
5. **At the level of anteroinferior terminal branch of RPVB-**anterior surface of the initial part in specimen marked as XXI.

## DISCUSSION

The French anatomist and surgeon Claude Couinaud<sup>3</sup> spent many years in investigation of the liver anatomy. He said that if the order of branches (ducts) was higher the anatomical varieties were numerous. Also, at the level of first order of portal, arterial and biliary elements he had established that arterial and biliary duplications were more frequent in relation to the portal ones.

In the present study MPV in all analyzed cases (27/27) was observed. In the literature absent portal vein bifurcation and a single intrahepatic portal venous arch as a rare variant were described by Couinaud<sup>3</sup> and Sahoo et al.<sup>16</sup>

A conventional anatomy of portal ramification in the right hemiliver was presented in a very high percentage i.e. portal vein bifurcation into the left and right branches, and trifurcating was rare, which was in agreement with the results (88% and respective 12%) presented by Gupta et al.<sup>6</sup>

Comparison of portobiliary elements of the hepatic order showed that: RPVB in 24/27 cases (88.89%) was present and in 3/27 cases (11.11%) was absent contrary to RHD found in 15/27 cases (55.55%) and in 12/27 cases (44.44) was absent (replaced by two sectoral ducts with confluence on the opposite site). Also, the comparison of specimens without portobiliary elements of the hepatic order showed discrepancy as follows: RPVB in specimens marked as XXIV, XXIX and XXX was absent, while RHD among those specimens was absent only in the specimen marked as XXIV. So, the absence of RPVB/RHD was in relation 3/1.

Similar to the found variations in the branching patterns of RPVB was the variant portovenous anatomy detected in 35% on the CT portographies by Covey et al.<sup>17</sup> They also noted that branches to segments VII and VI were separate branches originating from right portal vein and finding of trifurcation into APVB, Sg 6 and Sg 7 PBs. However, according to these authors' opinion conventional arteriportography was limited in determining segmental branch patterns.

Atasoy and Ozyurek<sup>18</sup> investigated the prevalence of variant main and right portal vein ramification with MDCT and among patients with conventional MPV branching (65.5%) variant right portal vein branching was found in 16.8%.

Van Leeuwen et al.<sup>19</sup> in their in vivo study illustrated that right hemiliver was divided into an anterosuperior sector and a posteroinferior sector. Additionally, a total of 15 accessory portal sectors were present, each arising directly from the portal bifurcation or the right portal trunk. The same year van Leeuwen et al.<sup>20</sup> found a conventional branching pattern in 2 of 10 volunteers, wherein no portal branches crossed the segmental boundaries. As they stated, the studies based on corrosion specimens, described a large number of variations

in ductal branching patterns and segmental anatomy.

In support to the above-mentioned statement are the results of our study about ramification patterns of PPVB. They are in agreement with the investigated aspects of the vascular morphology in the posterior sector by Hata et al.<sup>21</sup> Using the dissection they described four major patterns of branching of the posterior sectorial trunk of the portal vein system: group A (32%) an arch-like pattern sending multiple branches to Sg 6 and Sg 7; group B (27.9%) bifurcation into branches to Sg 6 and Sg 7 that allowed to identify segments 6 and 7 based on the portal vein system; group C (6.6%) trifurcation into branches to Sg 6, Sg 7, and an intermediate branch, which supplied both segments or a gray zone between them and group D (33.5%) included variations of the anterior segmental branches, and in specimens of this group, the anteromedial border of the sector was difficult to identify. They pointed out the difficulty in discriminating the intermediate branch from a branch to Sg 7.

Analysing the branching patterns of RPVB and PPVB and origin of Sg 6 and Sg 7 PBs it was noted that these segmental branches can have a total or partial origin from the APVB or can form trifurcation with this branch. This finding is in agreement with Couinaud's<sup>22</sup> investigation on injection-corrosion casts.

The observed plurality of the branches supplying Sg 6 may be a cause of postoperative complications but on the other hand this feature may be of positive surgical sentence when one accessory portal branch, on contrary to the main segmental portal branch, supplies the affected area.

The new surgical technique for a precise tailoring of the area of hepatic resection using inflow and outflow modulation was described by Donadon et al.<sup>23</sup>

At the level of right hemiliver posterior sector only PPVB as variable was observed while PSD was present in all observed cases. Comparison of ramification patterns of the PPVB with merging patterns of the segmental ducts into PSD encountered very different relationships.

Among the cases with modal type of merging into PSD in 13/19 (68.42) coincidence was found, contrary to 6/19 (31.58%) cases with absent PPVB and present PSD. Also, among the cases with different modalities of merging of the segmental ducts into PSD 8/27 (25.9 %) only in 2/8 (25%) cases coincidence was found. Even among the cases with modal type of merging into PSD there was a case with very significant differences of portobiliary anatomy, for e. g. No. XXX with absent RPVB and PPVB but present RHD and PSD, (Figure 1 and 2).

In the Greek cadavers atypical branching patterns of the RHD were found in 34.25% of cases, of which in 4.11% drainage of the right posterior hepatic duct into the left hepatic was found.<sup>24</sup> Using the intraoperative cholangiograms of 300 consecutive LDLT donors Choi et al.<sup>25</sup> noted typical anatomy of the intrahepatic ducts in 63% and as the most common anatomic variant drainage of the PSD into LHD in 11% of donors.

The current trend of using MR cholangiography as modality of choice in the evaluation of biliary diseases and the in-



**Figure-1:** Right-anterior view of the portobiliary cast from specimen no. XXX. Posterior sector duct formed by segment VII and VI ducts vaults above the APVB arch.



**Figure-2:** Anterior view of diaphragmatic surface of the portobiliary cast from specimen no. XXX. PSD and ASD merge into short RHD anterior and below to the transverse part of the LPVB.

creasing complexity of hepatic surgical procedures and biliary interventions, however, necessitate a more widespread and appropriate knowledge of these anatomic variations.<sup>26</sup>

On the basis of MDCT angiography and MDCT cholangiography the second order portal venous variants in 10 (18%) and biliary branch variants in 23 (41%) of 56 patients were seen by Chen et al.<sup>27</sup> They found that concordance between second-order portal venous and biliary tract anatomies was statistically significant. According to Macdonald et al.<sup>28</sup> on the preoperative hepatic CT scans and intraoperative cholangiograms portal venous and hepatic arterial branching patterns did not correlate well with biliary anatomic variants. Biliary anomalies in 15 (38%) of 39 patients were present. Of 23 patients with anomalous vascular anatomy, 7 (30%) had biliary anomalies. Of 16 patients with conventional vascular anatomy, 8 (50%) had biliary anomalies.

Variant PV anatomy in 52 (13%) of 386 transplants using right lobe grafts associated with a high (54%) incidence of biliary variations was seen by Guler et al.<sup>29</sup> Similar report on this subject was given by Ozsoy et al.<sup>30</sup> about vascular and biliary variations in Turkish liver donors. The relationship between the bile ducts and portal vein variants showed high probability of coinciding variations of bile ducts in subjects

with portal vein variants.

Concerning the all levels of portobiliary branching in the present study only one specimen (no. III) was with conventional anatomy in the right hemiliver.

## CONCLUSION

Normal portal vein anatomy may be accompanied with comparable or variant biliary anatomy as well as variant portal vein anatomy may be accompanied with comparable variant or normal biliary anatomy.

## ABBREVIATIONS

Left Portal Vein Branch (LPVB); Anterior Portal Vein Branch (APVB); Segment (Sg); Portal branch (PB); Portal branches (PBs); Portal Trunk (PT); Anterior Sector Duct (ASD); Right Hepatic Duct (RHD); Portal Vein (PV); Left Hepatic Duct (LHD)

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# Assessment of Unmet Need for Family Planning and its Association with Reproductive Behaviour of Women in Rural Jaipur

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## ABSTRACT

**Introduction:** The concept of unmet need refers to a gap between someone's stated fertility preferences and his or her contraceptive use at a given point of time. The concept can serve as a basis for identifying subgroups that are in need of programmatic action. Thus, estimation of unmet need is a powerful concept for family planning programmes. The aim of present study was to estimate the unmet need for family planning and its association with reproductive behaviour of women with the unmet need.

**Materials and methods:** A community based cross sectional study was carried out among rural women in Jaipur. Total 550 women were interviewed by systematic random sampling and a pre-designed and pre-tested questionnaire was used to record the informations. The data were entered into Microsoft Excel 2010 spreadsheets and analyzed using "Chi square test" of significance to find out association between unmet need and reproductive behaviour of women.

**Results:** In the present study, 17.82% women of reproductive age group had an unmet need for family planning, of which 12% had unmet need for limiting and 5.82% for spacing the births. The unmet need was significantly associated with age at marriage, duration of active married life, age at first child birth, total number of living children and total number of male and female children. Lack of motivation (41.84%), various obstacles (35.71%) and lack of information (22.45%) were the major reasons for unmet need.

**Conclusion:** Our study showed a higher unmet need in the study area as compared to national and state average, showing a need for an effective education campaign and awareness programme among the study population.

**Keywords:** Assessment, contraceptives, family planning, reproductive behaviour, unmet need.

## INTRODUCTION

Studies in less developed countries have shown an inconsistency in women's responses regarding contraceptive use. A significant number of women say that they do not want another child but are not using any method of contraception. These women refer to having "unmet need" for family planning. The concept of unmet need refers to a gap between women's stated fertility preferences and contraceptive use at a given point.<sup>1,2</sup>

Estimation of unmet need is a powerful concept for family planning programmes. The concept can serve as a basis for identifying subgroups that are in need of programmatic action. The level of unmet need in a country is not static but always in a flux, depending on the interplay of two factors – fertility desires and contraceptive use. Unmet need rises as more women would like to control their fertility but for var-

ious reasons are unable to do so, and it falls as more women start practicing contraception.<sup>2,3</sup>

Despite good interventions and concerted efforts, unmet need for family planning in Rajasthan is 14.6%, which is above the national average (12.8%).<sup>4,5</sup> The causes of unmet need are complex. Surveys and other in depth research reveal a range of obstacles and constraints that can undermine a woman's ability to act on her childbearing preferences.<sup>6</sup>

The extent of acceptance of contraceptive methods still varies within, between societies and among different castes and religion groups. The factors responsible for such varied picture operate at the individual, family and community levels with their roots in the socio-economic and cultural milieu of Indian society.<sup>7</sup>

In most of studies major focus was given on socio-demographic characteristics of women instead reproductive behaviour like, age at marriage, duration of active married life, age at first child birth, total number and sex of living children. So, the present study was planned to assess the extent of unmet need and its association with reproductive factors among married women in a rural community of Vatika village, district Jaipur.

## MATERIALS AND METHODS

It was a community based cross sectional study, carried out in a field practice area covered under rural health training centre of a private medical college in Jaipur (Rajasthan). The study population consists of all the married women in the reproductive age group (15-49 years) residing in Vatika village. According to census 2011<sup>8</sup>, population of village is 10590 with total 1677 families residing.

**Inclusion criteria:** Married women of reproductive age group (15-49 years).

**Exclusion criteria:** All unmarried female of reproductive age group, married female less than 15 years and more than 49 years and married women who were not permanent resident of Vatika village.

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**Sample size:** Using prevalence of reported unmet need for family planning in National Family Health Survey-3 in Rajasthan of 14.6%<sup>6</sup> and an absolute error of 3% a sample size of 550 was arrived at.

**Sampling procedure:** Systematic random sampling method was used to select the study population. There were 1677 families in the Vatika village as per Population Census 2011. First family was randomly selected using currency note method. All the married women of the selected family in the reproductive age group (15-49 years) present at the time of data collection were included in the study. After selecting the first family, every third family was taken till the desired sample size was met.

**Method of data collection:** After obtaining approval from institutional ethics committee house to house survey was done and data collected by taking interview of the married women. Each respondent was explained the purpose of the study prior to the administration of tools of data collection and informed consent was obtained. The confidentiality of the information was assured. A pre-designed and pre-tested questionnaire was used to collect the data.

### STATISTICAL ANALYSIS

The data were entered into Microsoft Excel 2010 and analyzed using “Chi square test” to find out association between unmet need for family planning and reproductive behaviour of women.

### RESULTS

Among the 550 women interviewed, it was observed that 214 (38.91%) women were not in need of any family planning, 238 (43.27%) women had their needs met and 98 (17.82%) was the number of women who had unmet need for family

Need of family planning	Number	Percent
No need	214	38.91
Met need	238	43.27
Unmet need	98	17.82

**Table-1:** Distribution of women according to need of family planning

Women	Number	Percent
Women with unintended pregnancy (unmet need for limiting)	8	1.46
Women with mistimed pregnancy (unmet need for spacing)	4	0.73
Women with unintended recent birth (unmet need for limiting)	2	0.36
Women with mistimed recent birth (unmet need for spacing)	1	0.18
Do not want a child (unmet need for limiting)	56	10.18
Want a child after two year (unmet need for spacing)	27	4.91
Total	98	17.82

**Table-2:** Distribution of women according to status of unmet need for family planning

planning (Table 1).

Among the 98 women who had unmet need for family planning, there were 8 (1.46%) pregnant women whose pregnancies were unintended and 4 (0.73%) others whose pregnancies were mistimed. 2 (0.36%) postpartum amenorrheic women said that their recent births were unintended and 1 (0.18%) postpartum amenorrheic women said that her recent birth was mistimed. 56 (10.18%) non-pregnant women had an unmet need for limiting and 27 (4.91%) non-pregnant women had an unmet need for spacing. Therefore, in present study total unmet need for family planning was 17.82%; of which 12% for limiting and 5.82% for spacing (Table 2).

Table 3 shows association of unmet need for family planning with reproductive behaviour of women. It was observed that age at marriage, duration of active married life, age at first child birth, total number and sex of living children were significantly associated with unmet need for family planning. The unmet need was more among women who got married before the age 18 years (26.11%) followed by those who got married between 18 and 25 years (15.61%) and after the age of 25 years (10.13%).

Variables	Yes	No	Chi Square (df)	‘P’ value
	n (%)	n (%)		
Age at marriage (in years)				
< 18	41 (26.11)	116 (73.89)	11.622 (2)	0.003
18-25	49 (15.61)	265 (84.39)		
> 25	8 (10.13)	71 (89.87)		
Duration of active married life (in years)				
< 1	5 (11.63)	38 (88.37)	20.191 (5)	0.001
1-5	19 (13.19)	125 (86.81)		
6-10	35 (29.17)	85 (70.83)		
11-15	21 (21.88)	75 (78.12)		
16-20	11 (17.74)	51 (82.26)		
> 20	7 (8.24)	78 (91.76)		
Age at first child birth (in years)				
< 18	14 (14.43)	83 (85.57)	9.097 (2)	0.011
18-25	68 (24.20)	213 (75.80)		
> 25	11 (11.70)	83 (88.30)		
Total number of living children				
0	5 (6.41)	73 (93.59)	17.641 (4)	0.001
1	12 (14.46)	71 (85.54)		
2	19 (17.59)	89 (82.41)		
3	26 (16.77)	129 (83.23)		
≥ 4	36 (28.57)	90 (71.43)		
Number of male children				
0	18 (11.11)	144 (88.89)	9.062 (3)	0.037
1	31 (17.61)	145 (82.39)		
2	35 (22.88)	118 (77.12)		
≥ 3	14 (23.73)	45 (76.27)		
Number of female children				
0	20 (11.83)	149 (88.17)	8.800 (3)	0.041
1	34 (19.21)	143 (80.79)		
2	30 (19.23)	126 (80.77)		
≥ 3	14 (29.17)	34 (70.83)		
df= Degree of freedom				

**Table-3:** Association of unmet need for family planning with reproductive behaviour of women

Reason for non-usage	Number	Percent
Lack of information	22	22.45
Unaware of need	6	6.12
Place of contraceptive facility was unknown	2	2.04
Fear of side effects	8	8.16
Myths and misconceptions	6	6.12
Lack of motivation:	41	41.84
Postponed until another time	31	31.63
No faith	3	3.06
Indifference	7	7.14
Obstacles	35	35.71
Place of contraceptive facility too far	5	5.10
Familial opposition	10	10.20
Husband not willing	13	13.27
Religious beliefs	7	7.14
Total	98	100

**Table-4:** Distribution of women with unmet need according to reason for non-use of contraception

The unmet need was highest between 6 and 10 years duration (29.17%) followed by 11-15 years (21.88%), 16-20 years (17.74%), 1-5 years (13.19%), less than one year (11.63%) and more than 20 years (8.24%). It was observed that the unmet need was more among women who delivered their first child between 18-25 years (24.20%) followed by those who delivered before age of 18 years (14.43%) and after the age of 25 years (11.70%).

It was seen in this study that as the number of living children increased the unmet need for family planning also increased significantly ( $P < 0.01$ ). The unmet need was highest among women who had 4 or more children (28.57%) followed by 2 children (17.59%), 3 children (16.77%), 1 child (14.46%) and lowest (6.41%) in those who had no living child. It was observed from this study that as the number of male children increased the unmet need for family planning also increased significantly ( $P < 0.05$ ). Similar pattern was observed with number of living male and female children.

In the present study, lack of motivation (41.84%), various obstacles (35.71%) and lack of information (22.45%) were the common reasons for unmet need for family planning (Table 4).

## DISCUSSION

In our study, married women of 15 to 49 years were included. Similar reproductive span was taken by recent national level surveys (NFHS-3<sup>5</sup>, DLHS-3<sup>9</sup>).

The present study showed 17.82% unmet need for family planning among women of reproductive age group. Similar findings were observed in previous studies by Yadav et al<sup>10</sup> at Ballabgarh, Haryana (17.5%), Indu<sup>11</sup> at Thiruvananthapuram (17.0%) and Sengupta and Das<sup>12</sup> in Jaipur Rajasthan (18.6%).

In the present study, unmet need for limiting was more (12%) as compared to unmet need for spacing (5.82%). Similar findings were observed in previous studies by Yadav et al<sup>10</sup> at Ballabgarh, Haryana (11.5% v/s 6%), Andurkar et al<sup>13</sup> at

Aurangabad, Maharashtra (16.93% v/s 3.61%), Saini et al<sup>14</sup> at East Delhi (18.7% v/s 6.7%), Lata et al<sup>15</sup> at Kishanganj, Bihar (14.5% v/s 9.4%).

The present study showed an inverse and highly significant association ( $P < 0.01$ ) of unmet need with age of woman at marriage. The unmet need decreased with increase in age of women at marriage. Similar findings were found in previous studies by Korra<sup>16</sup> in Ethiopia and Bhandari et al<sup>17</sup> in Nepal. While contrary findings were observed by Prusty<sup>18</sup>, who reported that unmet need was more among those women who got married after 18 years as compared to those who got married before 18 years of age.

The unmet need was also significantly ( $P < 0.01$ ) associated with duration of active married life. The unmet need increased with increase in duration of active married life up to 10 years thereafter unmet need decreased. The unmet need was significantly ( $P < 0.05$ ) more among women who delivered their first child between 18-25 years followed by before age of 18 years and after the age of 25 years. In a previous study by Bhattathiry and Ethirajan<sup>19</sup> at Cuddalore district, Tamil Nadu, an inverse association between age of women at first childbirth and unmet need was found, which was significant.

It was observed from present study that as the number of living children increased the unmet need for family planning also increased significantly ( $P < 0.01$ ). Similar findings were observed in previous studies by Saini et al<sup>14</sup> at East Delhi, Lata et al<sup>15</sup> (2012) at Kishanganj, Bihar whereas Bhattathiry and Ethirajan<sup>19</sup> (2014) at Cuddalore district, Tamil Nadu found inverse association between number of living children and unmet need, which was significant.

In the present study, it was observed that as the number of male children increased the unmet need for family planning also increased significantly ( $P < 0.05$ ) and similar trend was also observed for female children. Similar results were observed in previous study by Prusty<sup>18</sup> in Jharkhand, Chhattisgarh and Madhya Pradesh while Pal et al<sup>20</sup> in urban slums of Lucknow, reported high unmet need with less number of sons. In the present study, most common reason for unmet need for family planning was "postponed until another time" (31.63%), followed by unwillingness of husband (13.26%), opposition by family (10.20%), fear of side effects (8.16%), indifference (7.14), religious beliefs (7.14%), unaware of need (6.12%), myths and misconceptions (6.12%), place too far (5.10%) and some other reasons. In previous studies by Lata et al<sup>15</sup> at Kishanganj, Bihar, Puri et al<sup>21</sup> at urban slum of Delhi and Yerpude et al<sup>22</sup> in Guntur, Andhra Pradesh found that opposition from husband or family was the most common reason for unmet need.

## CONCLUSIONS

In our study the unmet need for family planning was more as compared to national and state average showing a need for an effective education campaign among the study population. Lack of motivation and obstacles were the main causes of unmet need for family planning which can be overcome by awareness and education campaign.

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# Self Reported Oral Health, Self Care and Dental Attendance of Pregnant Women in India: A Postnatal Survey

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## ABSTRACT

**Introduction:** Daily oral hygiene and regular dental visits are important components of oral health care. The aims of this study were to assess women's knowledge and experiences of dental health in pregnancy, including their oral hygiene behaviour and dental visiting habits and to examine the self-care practices of pregnant women in relation to their oral health.

**Material and Methods:** Women in the postnatal ward at a private hospital completed a questionnaire to assess their knowledge, attitudes and practices to periodontal health. Pregnancy outcomes were collected from their medical records and results were analyzed.

**Results:** Of the 259 women enrolled in the survey, 213 (89.8%) completed the questionnaire. Almost 63.8% (136) were in the age group of 21-29 years. Most women demonstrated reasonable knowledge about dental health, with 185 (86.8%) of the women aware that daily brushing would help prevent gum disease. However only 59 (27.6%) visited the dentist in the last twelve months for check up and treatment.

**Conclusion:** Most women were knowledgeable about oral and dental health. Whether more intensive dental health education in pregnancy can lead to improved oral health and ultimately improved pregnancy outcomes requires further study.

**Keywords:** dental health, periodontal health, pregnancy

## INTRODUCTION

Pregnancy is a delicate condition involving complex physical and physiological changes. The mouth is an obvious portal of entry to the body, and oral health reflects and influences general health and well being. In recent times, there has been a greater focus on the oral health of pregnant women. The most important objective of dental health care in pregnancy is to establish a healthy environment through adequate plaque control by brushing, flossing and professional prophylaxis including scaling, root planing and polishing.<sup>1</sup> Dental treatment can be safely provided at any time during pregnancy<sup>2</sup> allowing pregnant women to achieve an optimal level of dental health throughout their pregnancy. During pregnancy, the commonest problems encountered in the oral cavity include gingivitis, periodontitis, pregnancy tumour, caries, etc. Gingivitis is an inflammation of the soft tissues surrounding a tooth or gingiva not causing loss of periodontal attachment, whereas periodontitis causes inflammation and destruction of supporting tissues around the teeth.<sup>2</sup> Periodontal disease has the potential to affect pregnancy outcomes. A systematic review of 25 studies (13 case-control, 9 cohort and 3 controlled trials) has demonstrated that periodontal disease may be associated with adverse pregnancy outcomes in hu-

mans.<sup>3</sup> Although some observational studies have indicated a significant association of periodontal disease with adverse pregnancy outcomes.<sup>4,5</sup> others have not.<sup>6,7</sup> During pregnancy due to hormonal changes, there is an increase in the level of oestrogen and progesterone which can lead to hyperaemia, oedema and bleeding in the periodontal structures. This makes the tissues susceptible to bacterial infections.<sup>8</sup>

Studies have shown that lower educational level correlates to greater incidence of periodontal disease. A similar correlation has been observed with lower socio-economic status and high periodontal disease state.<sup>8-10</sup>

Fortunately, periodontal disease can be easily prevented by controlling plaque by methods like brushing, flossing, scaling and root planing. These measures can aid in maintaining a good oral health in pregnancy.<sup>11</sup> There is, however, minimal information available on women's understanding of dental hygiene and whether pregnant women comply with current oral health strategies. The aims of this survey were to assess women's knowledge and experiences about dental hygiene in pregnancy in India and assess the self-care practices of pregnant women in relation to their oral health.

## MATERIAL AND METHODS

The women who gave birth to a healthy infant with no major congenital anomaly were included in the study. A questionnaire was designed to assess the knowledge about dental health, their past dental experiences and experiences in the past one year. Information about role of periodontal disease

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and plaque in oral health, particular dental requirements in pregnancy including common signs and symptoms of gingival and periodontal health was also obtained.

Relevant clinical information was sourced from the medical records of the woman and her infant. Eligible women were approached on the postnatal ward and given a study information pamphlet. Women who gave informed written consent were asked to complete the questionnaire.

## RESULTS

### Baseline demographic characteristics

More than half of the women enrolled in the study were between the age of 21-29 years (136, 63.8 %). Most of the women enrolled in the survey were primigravida (119, 55.8 %). (Table 1).

### Knowledge of dental practices

Most women had a good understanding of good oral hygiene, with 185 (86.8%) women agreeing brushing their teeth would help prevent gum disease. Likewise, most women understood using dental floss (163, 70.8%) would help prevent gum problems. However less than half of the women surveyed knew that fluoride, whether in toothpaste or water helps in preventing tooth decay. (Table 2)

### Knowledge of dental disease and gingival health

Most women had some knowledge of dental disease and gingival health with the majority of women surveyed agreeing sweet foods could cause tooth decay (179, 84%). However, fewer were aware that dental problems can be serious (can cause other health problems (107, 50.22%). Less than half of the women surveyed knew about the role of dental plaque in causing periodontal disease. (Table 3)

### Current dental practices

Of the women surveyed, 199 (93.4%) stated they brushed their teeth one or more times a day with just over half (111, 52.1%) indicating they used dental floss weekly or more. In contrast only just over a third of women (221, 55%) said that they used mouthwash daily. (Table 4)

### Knowledge of dental problem in last 12 months

Almost half of the women, (87, 40.8%) stated they had gums which hurt and bled at some stage during the previous twelve months and more than a third 75 (35.2%) had persistent bad breath. 77 (36.1%) women had sores on their tongue and/or inside their mouth; while only 10 (4.6%) women had a broken or chipped natural tooth during the previous 12 months. (Table 5)

### Dental attendance in the past 12 months

During the previous twelve months only 59(27.6%) women surveyed had attended the dentist. This is comparable to other studies which have reported prevalence rates of dental care use during pregnancy in the range from 23% to 43%.<sup>10,11</sup> Less than a fifth of the women surveyed, 42 (19.5%), had at least one scaling and cleaning of their teeth during these dental visits. (Table 6)

Demographic feature		Number	Percentage
Age in years	<20	49	23
	21-29	136	63.8
	30<	28	13.1
Parity	0	119	55.86
	1-2	60	28.1
	3 and above	34	15.9

**Table-1:** Demographics of women who completed the survey

Dental practice	Number	Percentage
Daily Brushing of teeth would help prevent gum disease	185	86.8
Use of dental floss would help prevent gum problems	163	70.8
Fluoride in toothpaste or water helps to prevent tooth decay	99	46.4

**Table-2:** Knowledge of dental practices of women who completed the survey

Dental disease	Number	Percentage
Sweet foods could cause tooth decay	179	84
Dental problems can cause other health problems	107	50.2
Role of dental plaque in causing periodontal disease.	105	49.2

**Table-3:** Knowledge of dental disease and gingival health of women who completed the survey

Current Dental practice	Number	Percentage
Brush teeth one or more times in a day	199	93.4
Use dental floss once or more weekly	111	52.1
Use mouthwash daily	74	34.7

**Table-4:** Knowledge of current dental practices of women who completed the survey

Dental problem in last 12 months	Number	Percentage
Bad breath	75	35.2
Bleeding gums	87	40.8
Sores	77	36.1
Gingival growth	14	6.5
Broken tooth	10	4.6
Any other	8	3.7

**Table-5:** Knowledge of dental problem in last 12 months of women who completed the survey

Dental visit and treatment in last 12 months	Number	Percentage
Visited dentist for routine check up	59	27.6
Had scaling and polishing done	42	19.7
Required fillings	49	23
Had tooth extraction	19	8.9
Any other treatment	21	4.1

**Table-6:** Knowledge of dental attendance in last 12 months of women who completed the survey

## DISCUSSION

In this survey of recently pregnant mothers, most women were knowledgeable about dental health but only a small percentage knew about periodontal disease. They were also not aware of the changes and increased susceptibility rendered to oral cavity during pregnancy. Preoccupation with pregnancy and the bodily changes led to neglect of the otherwise routine dental check-ups or maintenance of dental hygiene as per previous standards.

Gastric acid regurgitation is more frequent during pregnancy. This can cause erosion of the protective enamel cover of the teeth. Thus if rough tooth brushing is done post vomiting in this period it can lead to more severe tooth surface loss. Preventive fluoride application can help to reduce such damage.<sup>12</sup>

many factors contribute in increased caries incidence in pregnant women including increased acidic oral environment, changed dietary preferences and neglect of oral health. inflammation of gingival tissues is the most common oral finding accounting to about 60 to 75 % whereas inflammation of periodontal tissues accounts for 30% and pregnancy tumour about 5%.<sup>12</sup>

Women in our study sample confirmed many common signs of periodontitis including dysgeusia, spontaneous gingival bleeding and discomfort.<sup>8,13</sup> Unfortunately less than half of these women had any dental treatment done for the same. infact only about one third of the sample even had a dental consultation done in the last one year.

Similar finding have been reported in studies in America where only half of the study population could obtain dental intervention.<sup>10,14</sup>

The ramifications of these results indicate a high amount of neglect in this population regarding the dental and oral health.<sup>1</sup>

This survey also highlights important gaps in dental knowledge and practices in women. Providers and public health clinics already have an established role in the prevention and early identification of health problems and routinely discuss a variety of topics; this role could be expanded to include provision of counseling and screening on oral health and dental care in early pregnancy. Oral health care in pregnancy is often avoided and misunderstood by physicians, dentists, and patients. Lee et al conducted a study to understand US dentists' attitudes, knowledge, and practices regarding dental care for pregnant women. They put forth five attitudes (perceived barriers) associated with providing less dental services, namely: time, economic, skills, dental staff resistance, and peer pressure.<sup>15</sup>

Proper oral health screening, timely advice on oral hygiene maintenance and appropriate referral for dental treatment is must for every pregnant woman. Most dental treatments including fillings, gingival and periodontal treatments with appropriate radiographic investigations are ideally performed in the second trimester of pregnancy.

Anti bacterial mouthwashes like Xylitol and chlorhexidine when used in addition for women with high cariogenic risk will help to reduce chance of transmission of microorganism

to the offspring. Timely oral health care will thus help in reducing the same in the infants.<sup>12</sup>

Various articles have identified the potential challenges in achieving good oral and dental health in pregnancy including traditional beliefs of risk associated with dental procedures, inappropriate information amongst the mothers as well as health care personnel.<sup>16</sup>

It is thus important to increase awareness among the susceptible pregnant women about the importance of maintaining dental and oral health in view of long term benefits for themselves as well as their children.<sup>17</sup>

Efforts should be made to educate the health care personnel including the doctors, nurses and all associated medical staff about the measures of prevention of dental diseases. This training will enable them to impart appropriate guidance and encourage their patients to take timely dental treatment.

This knowledge can also be included in their training to enable them to give a comprehensive treatment regarding nutrition, role of possible teratogenic, effect of certain drugs, vitamin and other deficiencies on the growth and development of oral and dental tissues of their children as well as their future oral health needs.<sup>1</sup>

The period of pregnancy can be utilised to lay down a solid foundation of dental and oral care practices for the mother herself as well as for her children.<sup>16</sup>

## CONCLUSION

The finding in this study sheds light on the important aspect of dental health during the critical period of pregnancy in the life of a women. The study shows a lack between knowledge of dental health among women and seeking dental treatment for themselves. It is important to educate the pregnant women and the health care givers to ensure optimum oral hygiene practices, timely intervention and dental treatment to ensure good oral health of the mother and the child.

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# Role of Diffusion Weighted Imaging in Intracranial Tumors with Pathological Correlation

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## ABSTRACT

**Introduction:** Intracranial tumors can occur in all age groups and can be grossly divided into intra axial and extra axial tumors. In children, intracranial tumors are common in posterior fossa region. In adults these are more common in supratentorial and intra axial regions. Aim and Objectives of the study were to test a hypothesis that ADC values can be used to differentiate tumor, edema and normal brain tissue, to compare and correlate ADC values of different components of tumor such as solid, necrotic, cystic component and perilesional oedema, normal brain parenchyma and to correlate the ADC values of tumor with the cellularity/histopathological grading of tumor/mass.

**Materials and Methods:** A prospective study of DWI in Intracranial tumors and correlation with pathological findings, was conducted on patient population, referred for MR imaging of brain to Department of Radiology, Osmania General Hospital, Hyderabad during period between 2011 to 2013.

**Results:** Magnetic resonance imaging was performed in 63 patients with brain tumors in a 2 year period from December 2011 to September 2013. The patients had age group ranging from 2 months to 69 years with a mean age of 29 years. 29 were males, 23 were females. Most of the cases were in the first decade. The most common clinical presentation is intracranial hypertension (92.3%). Of 63 cases, most common tumor encountered in our study was Meningioma (11)

**Conclusion:** Diffusion weighted imaging is useful in differentiating epidermoid from arachnoid cysts. ADC values from the solid components can be used to differentiating CP- angle meningiomas from schwannomas. However, the ADC values are not useful in differentiating "Tumour infiltrated edema" from Vasogenic Edema".

**Keyword:** Intracranial Tumors, DWI, ADC Values, Meningioma, Schwannomas, Perilesional edema, Vasogenic edema.

## INTRODUCTION

Intracranial tumors can occur in all age groups and can be grossly divided into intra axial and extra axial tumors. In children, intracranial tumors are common in posterior fossa region. MRI and Diffusion weighted imaging help us in classification and characterization of the lesions. With advent of DWI and its ADC values, the diagnosis, classification, characterization and location of the lesion is made more precise and accurate.

### Physics of Diffusion Weighted Imaging

Diffusion-weighted (DW) magnetic resonance (MR) imaging provides image contrast that is dependent on the molecular motion of water, which may be substantially altered by

disease. The phenomenon of diffusion was first described scientifically long before the systematic development of thermodynamics, by Robert Brown (1773-1858). In fact, this phenomenon was named "Brownian motion" after him.

Classical Brownian motion or diffusion means the random motion of water molecules. It can be isotropic or anisotropic. Following the first description of the NMR effect, independently by Bloch in Stanford and by Purcell at the MIT<sup>1,2,3</sup> in 1946, the sensitivity of the technique for molecular diffusion processes was marked in Hahn's publication on spin echoes only four years later.<sup>4</sup> The details were analyzed further by Carr and Purcell in 1954.<sup>5</sup>

Stejskal and Tanner provided an early description of a DW sequence in 1965.<sup>6</sup> They used a spin-echo T2-weighted pulse sequence with two extra gradient pulses that were equal in magnitude and opposite in direction. The final breakthrough for the technique came with the reports from Michael Moseley's group in San Francisco that diffusion-weighted imaging allows the detection of ischemic tissue within minutes after onset of stroke under experimental conditions.<sup>14</sup>

The signal intensity (SI) of a voxel of tissue is calculated as follows<sup>15</sup>:

$$SI = SI_0 \times \exp(-b \times D),$$

SI<sub>0</sub> is the signal intensity on the T2-weighted (or  $b = 0$  sec/mm<sup>2</sup>) image, the diffusion sensitivity factor  $b = \gamma^2 G^2 \Delta^2 (\Delta - \Delta/3)$ , and  $D$  is the diffusion coefficient,  $\gamma$  is the gyromagnetic ratio;  $G$  is the magnitude of,  $\Delta$  the width of, and  $D$  the time between the two balanced DW gradient pulses.

### Apparent diffusion coefficient (ADC)<sup>6</sup>

According to Fick's law, true diffusion is the net movement of molecules due to a concentration gradient. However MR imaging, cannot differentiate molecular motion due to concentration gradients from molecular motion due to pressure gradients, thermal gradients, or ionic interactions. Also, with MR imaging we do not correct for the volume fraction available or the increases in distance traveled due to tortuous pathways. Therefore, when measuring molecular motion with DW imaging, only the apparent diffusion coefficient

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(ADC) can be calculated. The signal intensity of a DW image is best expressed as:  $SI = SI_0 \times \exp(-b \times ADC)$

**MATERIALS AND METHODS**

Patients for our prospective study were chosen from patient population referred for MR imaging of brain to Department of Radiology, Osmania General Hospital, Hyderabad during period from 2011 to 2013.

**Image acquisition and Analysis**

In all studies MR imaging was performed using a tailor made protocol with a clinical 1.5 T system (General electrical medical systems). A dedicated phased-array coil was used. Basic imaging protocol consists of fast spin echo T2 WI in axial, coronal and sagittal planes and DW, T1 and FLAIR images in axial plane. DW images were evaluated for the calculation of ADC values and ADC maps (General electrical medical systems). Absolute ADC value of Cystic, Solid and Necrotic component of tumor, Perilesional edema (T2 Hyperintensity) and normal appearing corresponding brain parenchyma, are calculated.

ADC values were normalized by dividing ADC values of tumors by those of normal appearing regions and the quotient will be expressed as a ratio.

Operated case will be evaluated by experienced histopathologist for the grading and cellularity of tumor.

All the collected data was analysed by using proper Bio-statistical methods.

**Parameters for diffusion weighted sequence**

Slices with 30% distance factor, Slice thickness 5 mm, TR-1000ms, TE-81ms, FOV Read-26 cm, FOV Phase, Scan time- 0.16 sec, Voxel size-1.8 x 1.8 x 5.0 mm, B-value- 0 and 1000, Echo spacing -0.73, Bandwidth-12.

**Post contrast T1W Images were employed in some patients**

**Contrast used:** Gadolinium contrast (Omniscan, GE health care, 0.1 mmol/kg body weight) used. No contrast reactions were encountered.

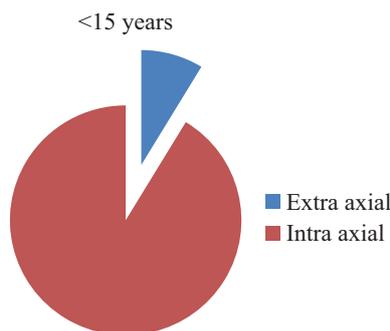
Scan time varied from 15 mins to 21 mins for sequences other than DWI. Images were analyzed on Functool 2 software version

Mean ADC value for each tumor was calculated using two to five regions of interests. In cases with contrast studies the ROIs were put in areas that were enhancing (for tumors having enhancing parts). For unenhancing tumors, ROIs were put in solid parts determined with the help of information gathered from other sequences.

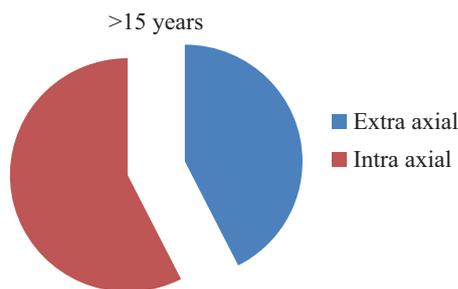
Two experienced neuropathologists did histopathological examination. Few tumors were surgically resected. Rest of the patients had undergone stereotactic biopsy.

**RESULTS**

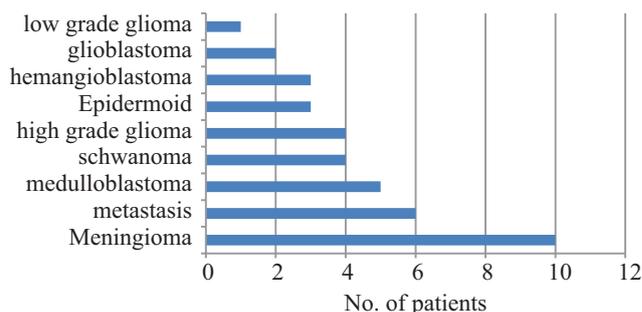
Magnetic resonance imaging was performed in 63 patients with brain tumors in a 2 year period from December 2011 to



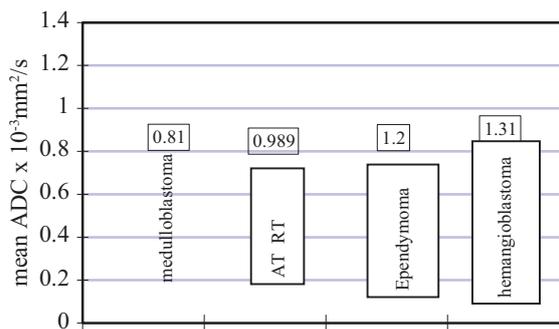
**Figure-1:** Location of tumours <15yrs



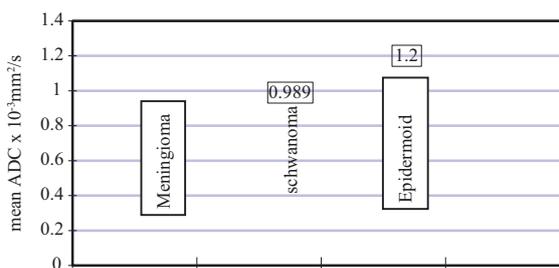
**Figure-2:** Location of tumours in >15yr



**Figure-3:** Characterisation of lesion in >15years group



**Figure-4:** ADC Values of paediatric posterior fossa tumours



**Figure-5:** Mean ADC in Extra axial lesions

September 2013. The patients had age group ranging from 2 months to 69 years with a mean age of 29 years, 29 were males and 23 were females. Most of the cases were in the first decade. The most common clinical presentation is intracranial hypertension (92.3%). Of 63 cases most common tumor encountered in our study was Meningioma (11) followed by Medulloblastoma (9), Metastasis (6), High grade glioma (7), Brainstem glioma (6), Pilocytic astrocytoma (5), Vestibular schwannoma (5), Ependymoma (4), Hemangioblastoma (3), Epidermoid tumor (3), Glioblastoma (2), AT-RT (1).

In <15years age group, Intra axial tumors (21) were more common than Extra axial tumors (2). Most common tumor encountered was Pilocytic astrocytoma (6) followed by Medulloblastoma (5), Diffuse low grade glioma (4), High grade glioma (3), Ependymoma (2), AT-RT (1), B/L Vestibular schwannoma (1), Meningioma (1). In >15 years group Most common tumor encountered was Meningioma (10) followed by Metastasis (6), Vestibular schwannoma (4), Medulloblastoma (5), High grade glioma (4) Hemangioblastoma (3), Epidermoid tumor (3), glioblastoma (2), Ependymoma (2), low grade glioma (1)

DWI characteristics of different tumors: Tumors with restricted diffusion are Medulloblastoma, Epidermoid tumor, AT-RT. Rest of the tumors were not restricted on diffusion. All Acoustic schwannomas were isointense to cortex on DWI and all Meningiomas were hyperintense to cortex.

Of the all posterior fossa tumours Medulloblastomas showing lowest ADC values ranging from 0.67 to 0.99, (mean 0.83), Atypical teratoid rhabdoid tumour ranging from Ependymoma ranging from 1.0 to 1.21 (mean 1.1), Pilocytic astrocytoma ranging from 1.3 -1.92 (mean 1.61).

## DISCUSSION

Role of diffusion weighted imaging in brain tumors was practically restricted to differentiation of epidermoid and arachnoid cyst. Diffusion imaging plays a small role in the detection of brain tumors. Compared with the sensitivity of conventional MR imaging, particularly T2 weighted, FLAIR and contrast enhanced T1 weighted sequences for the detection of brain tumors; the sensitivity of DW MR images and ADC maps is low.

One reason for this low sensitivity is that voxel sizes in diffusion MR imaging are generally larger than those used in conventional pulse sequences because of signal to noise limitations in the underlying echo-planar diffusion sequence. In addition there is no evidence that the contrast between most brain tumors and normal brain parenchyma on DW MR Images and ADC maps is superior to that found on images obtained with T2 W or FLAIR MR imaging techniques. Although reports of apparent decrease in diffusivity of few cerebral tumors have been published, there are very few studies which have evaluated diffusivity quantitatively. Our aim was to study the diffusivity of all the brain tumors quantitatively and correlate it with histopathological information such as subtype as well as grade of malignancy.

In our study, 11 cases of Meningiomas are included. Of these, 9 cases were showing no restriction on diffusion but



**Figure-6:** T2W MR show hyperintense lesion - s/o Schwannoma

isointense to cortex. 2 cases showed areas restriction within the lesion with less mean ADC values. Meningiomas showing ADC Values Ranging from 0.7 -1.2X 10<sup>-3</sup>.

Correlation between ADC values and tumor cellularity in both gliomas and meningiomas as study conducted by Kono et al -2001.<sup>13</sup> In our study, on comparison of vestibular schwannomas and meningiomas, signal intensity on T2W is higher in vestibular schwannomas than in meningiomas. Signal heterogeneity is common in vestibular schwannomas than in meningiomas. On DWI vestibular schwannomas were iso to hypointense to cortex with ADC values ranging from 1.2 -1.9 (mean 1.55) where as meningiomas were hyperintense to cortex with ADC values ranging from 0.7 -1.2 (0.95).

In our study, on comparison of posterior fossa tumours, all medulloblastomas are showing restriction with ADC values ranging from 0.67 -0.99 (mean 0.83). Most of the cases of ependymomas (except 1 case) show no restriction on DWI with ADC values ranging from 1 -1.21 (mean 1.1). This one case was diagnosed based on the associated finding (location, T1 Hyperintensity, Blooming on GRE). This is due to intratumoral hemorrhage which is restricted on DW image in Hyperacute, acute, early sub acute stage. This is same as said by Scott W. Atlas et al.<sup>7</sup> who indicate that hematomas composed of any and all of the evolutionary stages theorized to contain hemoglobin within intact RBCs (ie, hyperacute, acute, and early subacute hematomas) show significantly reduced ADC values compared with the single hematoma state theorized to be comprised of lysed RBCs (ie, "free" methemoglobin in subacute-to-chronic hematomas).

In our study, there were 5 cases of posterior fossa pilocytic astrocytomas of which 2 cases show typical imaging appearance of cystic lesion with mural nodule, 2 cases are solid lesions arising from vermis of the cerebellum. These cases were diagnosed based on appearance on T1, T2 W images (less heterogenous) and DW images. All the case of pilocytic astrocytomas were not showing restriction with ADC values ranging from 1.3 -1.92 (with mean 1.61). ADC values of pilocytic astrocytoma, ependymoma, medulloblastomas are 1.3 -1.92, 1 -1.21, 0.67 -0.99 respectively. These are comparable to study by Z. Rumboldt et al.<sup>8</sup>

Brainstem gliomas were seen in 5 cases in our study. All cases

showed enlarged pons and basilar artery encasement. 4 cases showed enhancing component, 1 case was non enhancing. All were showing mixed hypointense on T1W, hyperintense on T2W, heterogeneous on FLAIR and not restricted DWI. With ADC values ranging from 1.1 -1.8 (mean 1.5). These findings are comparable to those in *Neuroradiology* 2011.<sup>9</sup> We encountered 7 cases of high grade gliomas. Of these, the cases presented at the age of 2 years were more heterogeneous on T1WI, T2WI with minimal peri lesional edema. Based on these findings these were diagnosed as PNET. All the cases were showing diffusion restriction with ADC values ranging from 1 – 1.3. We encountered two cases of glioblastomas in the age distribution of 50 to 60 years. In these, one lesion located in corpus callosum was showing ADC values of 1.2 -1.4, based on the location it was diagnosed as Glioblastoma even though not showing significant restriction. In Another case, lesion located in left cerebellar hemisphere, not showing restriction with ADC values ranging from 1.2 -1.8, based on the location and age it was diagnosed as Metastasis. These findings were contradictory to findings shown in *Neuroradiology* 2011.<sup>9</sup>

Epidermoid tumors were seen in 3 cases, two were males and one in female. Both cases showed CSF SI on T1WI, T2WI sequences, not fully suppressed on FLAIR and with extension along cisternal spaces, encasement/ engulfment of vessels and nerves, no contrast enhancement and restricted on DWI. These findings go with findings shown in *American Journal of Neuroradiology*.<sup>10</sup> Both cases were correlated with histopathology.

Hemangioblastomas were seen in 3 cases, all were males with mean age was 39 years. 2 cases seen in cerebellar hemisphere were showing a large cyst and with isointense mural nodule which is intensely enhancing. One case was seen in vermis, which is predominantly solid with few cystic areas with heterogeneous signal intensity on all sequences and on contrast administration is heterogeneous and showing intense contrast enhancement. Multiple flow voids were seen in all cases. All features were histologically correlated. DW images in 2 of 3 patients with cerebellar hemangioblastomas showed notable hypointensity in locations corresponding to areas of solid enhancement on contrast enhanced MR images. This finding was not seen in other cellular tumors including medulloblastomas, metastases and lymphoma. In the present study, mean ADC value of cerebellar hemangioblastomas was higher than other posterior fossa tumors. However the difference was not significant.

Metastases were seen in 7 cases with mean age being 49 years. The primary was found to be lung carcinoma in 3 cases, breast carcinoma in 1 case, ovarian carcinoma in 1 case, thyroid carcinoma in 1 case and unknown primary in 1 case. 2 cases had associated supratentorial metastases, 1 case had bilateral cerebellar metastases. The opinion of many authors is that metastatic lesions are the commonest lesions in elderly involving the posterior fossa. Lung and Breast are the common primary sites, are concurrent with our observation. All cases showed heterogeneous enhancement and not restricted on DWI with ADC values ranging from 1 – 1.2.

These findings are correlated with the study conducted by *Eur J Radiol* 2010 Apr.<sup>11</sup>

Detection of restricted diffusion on DWI in intra cerebral metastases is not rare, particularly if the primary tumor is lung or breast cancer. However we found that there is no correlation between the metastasis showing restricted diffusion and primary pathology.

ADC values of peritumoral edema was calculated in all cases of high grade gliomas which was showing ADC values ranging from 1- 1.15. There is no difference in ADC values between tumour infiltrated edema and vasogenic edema. These findings were consistent with study conducted by Van Westen D et al 2006<sup>12</sup> who tried to determine whether the apparent diffusion coefficient (ADC) and fractional anisotropy (FA) can distinguish tumor-infiltrated edema in gliomas from pure edema in meningiomas and metastases. In his study, thirty patients were studied: 18 were WHO grade III or IV gliomas, 7 meningiomas, and 5 metastatic lesions. They concluded that values and lesion-to-brain ratios of ADC and FA in areas with T2-signal changes surrounding intracranial tumors and adjacent normal appearing white matter were not helpful for distinguishing pure edema from tumor-infiltrated edema when data from gliomas, meningiomas and metastases were compared.

## CONCLUSIONS

Diffusion weighted imaging is useful in differentiating epidermoid from arachnoid cysts. ADC values from the solid components can be used to differentiating CP- angle meningiomas from schwannomas. The ADC values correlated with tumor cellularity for both astrocytic tumors and meningiomas. The ADC values not useful in differentiating tumour infiltrated edema from vasogenic edema. The ADC values useful in differentiating the paediatric posterior fossa tumours.

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# Awareness of Basic Life Support among Dental Interns and Postgraduate Students in Davangere City- A cross Sectional Survey

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## ABSTRACT

**Introduction:** Awareness of basic life support is considered very low in the dental professionals so the present study was planned to assess and compare the awareness of basic life support among dental interns and postgraduate students in Davangere city

**Materials and methods:** Descriptive cross sectional survey was carried out among the dental internees (139) and post-graduates (156) of two dental colleges in Davangere city. A self-designed questionnaire comprising of 23 multiple choice questions covering varied aspects of basic life support of child and adult and 2 questions regarding training on BLS. Ethical clearance was obtained from institutional review board of Bapuji Dental College and Hospital. Descriptive statistics was generated in terms of frequencies and percentages. Chi square test was employed to find the association between qualification and awareness of basic life support.

**Results:** Among the participants 54% had poor awareness, 28.4% had moderate awareness and only 3% had very good awareness about basic life support. 90% of the participants in the study agreed that structured resuscitation training should be added in the curriculum. Post graduates had comparatively superior knowledge than the interns which was statistically significant at  $p=0.0001$ .

**Conclusion:** The results of the study showed that there is a lack of awareness regarding BLS among postgraduate students and interns. This is a serious issue needs to be promptly visualized and resuscitation skills should be a part of the undergraduate curriculum and regular reassessment would increase awareness and application of this valuable life-saving skill set.

**Keyword:** Dental Interns, Basic Life Support

## INTRODUCTION

Ronald Reagan said, "Failing to prepare is preparing to fail." This philosophy is nowhere more evident than during a medical crisis, when minutes can be the difference between life and death.

Emergencies can happen unexpectedly to anyone and everyday every human being is at a threat of life at any time and may require immediate medical treatment. If the treatment is not available, the emergency could result in weakened bodily functions, serious and lasting damage to organs, limbs or other body parts or even death.

Cardiac arrests, Cerebrovascular accidents, Respiratory failure, Myocardial Infarction and accidents are the most common emergencies with grave consequences but the high mortality associated with them can be easily prevented most of the times by some very simple maneuvers and skills. Cardiac

or respiratory arrests are a very common emergency in not just the adult group but also in the neonatal period.

The term Basic Life Support (BLS) refers to maintaining an airway and supporting breathing and the circulation. It is a level of medical care which is used for patients with life threatening illness until the patient can be given full medical care.<sup>1</sup> These emergencies can be easily managed by knowledge and practice of resuscitation skills.<sup>2</sup> It can be provided by trained medical personnel, including emergency medical technicians, paramedics, and by laypersons who have received BLS training. BLS is generally used in the pre-hospital setting and can be provided without medical equipment.

As a dental profession we are offering more advanced and extensive treatments to our patients. Life-threatening emergencies are more likely to occur within the confines of the dental office because of fear and anxiety which may make these patients prone to medical emergencies. The dental profession cannot turn a blind eye to these facts that make an emergency in their offices. In order to possibly prevent a medical emergency, one must prepare the entire dental office. BLS training is one of the fundamentals of good preparation. Hence, it is important for the dentists to have knowledge of Basic Life Support. But, the fact that many especially junior doctors are not competent in carrying out effective Basic Life Support. As a result, many may find it difficult when they come across an emergency situation.

There are not many studies to assess the knowledge of interns and post graduates of dentistry regarding awareness of basic life support especially in Davangere. Hence, this study was conducted with an aim to assess and compare the resuscitation knowledge among interns and post-graduates of Davangere city.

## MATERIALS AND METHODS

A cross-sectional survey was conducted to assess the awareness of basic life support among interns and post-graduates of two dental colleges (Bapuji Dental College and Hospital and College Of Dental Sciences) in Davangere city. Permission for conducting the survey was obtained from

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the principal of Bapuji Dental College and Hospital and all the Heads of the departments after appraising them about the study. Ethical clearance was obtained from institutional review board of Bapuji Dental College and Hospital. A written voluntary informed consent was obtained from the study participants before the start of the study. The study

was conducted during the college hours between 9 am to 5 pm, with a timespan of one month starting from October 2014 to November 2014. The survey instrument employed was a self-designed questionnaire comprising 23 multiple choice questions which focused on expansions of commonly used abbreviations of SCA (Sudden Cardiac Arrest), EMS (Emergency Medical System) and AED (Automated External Defibrillator) sequential steps in BLS, assessment and resuscitation technique with regard to airway, circulation, breathing in unresponsive victims of different age groups. 4 questions (Q22 and Q25) were directed towards training on BLS. Pilot study was conducted to know the reliability and validity (face and content validity) of the questionnaire

		Number	Percentage
Sex	Females	188	63.7
	Males	107	36.3
Qualification	Post graduates	156	52.9
	Interns	139	47.1

**Table-1:** Demographic details of the study population

Serial No.	Responses	Number of correct respondents	Percentage
1	The correct expansion of the abbreviation		
	SCA- Sudden cardiac arrest	225	76.3
	EMS-Emergency medical service	55	18.6
	AED- Automated electronic defibrillator	8	2.7
	CPR- Cardiopulmonary resuscitation	239	81
2	Look for safety should be the first response when you find someone unresponsive in the middle of the road.	71	24.1
3	Circulation- Airway - Breathing is the new sequence of BLS modification	102	34.6
4	Location of chest compression in infant during CPR is above the left side of the chest	76	25.8
5	Location of chest compression in adult is mid chest	64	21.7
6	Location of chest compression in pregnant woman is slightly higher on the sternum	108	36.6
7	100 / min is the rate of chest compression during CPR	108	36.6
8	Depth of chest compression in adult should be less than 2 inches	70	23.7
9	Depth of chest compression in children is in between 1/2 of depth of chest -1/3rd of depth of chest	27	9.2
10	The ratio of compressions to ventilations during CPR (single rescuer) is 30 to 2	50	16.9
11	Position of pregnant woman during CPR is best in supine position with firm wedge to support right side of the pelvis and thorax	53	18
12	When performing chest compressions in infant either two thumb encircling lower one third of sternum or middle and index fingers can be used	111	37.6
13	When performing chest compressions in adult the heel of one hand is used	168	56.9
14	Mouth to mouth and nose is used to perform rescue breathing in infants	75	25
15	If you do not want to give mouth to mouth breathing other alternatives should be carried out but the patient cannot be deprived from CPR	94	31.9
16	One can stop performing CPR When relieved by another trained in CPR or When you are exhausted or When the casualty is pronounced dead	105	35.6
17	The universal recognized distress signal for choking is clutching at the throat with one or both hands	170	57.6
18	If a person is alone and choking he should lean forward and press abdomen over a chair/ table with an edge or self-induction of vomiting should be carried out	134	45.4
19	You are witnessing an infant who started suddenly choking while he was playing with the toy, you have confirmed that he is unable to cry (or) cough- first perform Back blows and chest compression of five cycles each and then open the mouth to remove the foreign body	138	46.8
20	A 50 year old gentleman with retrosternal chest discomfort, profuse sweating and vomiting might suggest you of myocardial infarction, hence activate EMS, give an aspirin tablet and allow him to rest.	159	53.9
21	You are witnessing an adult unresponsive victim who has been submerged in fresh water and just removed from the water. He has spontaneous breathing but he is unresponsive the first step in CPR is to put him in recovery position	23	7.8

**Table-2:** Distribution of the respondents based on the correct responses to the questionnaire

and internal consistency of the questionnaire was checked by subjecting the data to Cronbach's test (Cronbach's alpha of 0.7).

The investigator distributed the survey questionnaire to all the interns and post graduate students at their respective clinical departments. The completed forms were collected back on the same day.

## STATISTICAL ANALYSIS

Statistical Package for Social Sciences software (SPSS version 17.0) was used to analyse the statistical data. The level of significance was set at 5%. Following the generation of descriptive statistics, Chi square test was run to find the association between qualification and awareness of basic life support.

## RESULTS

The present study was conducted to assess the awareness about basic life support among the interns and post graduate students of Dental colleges in Davangere city. The study population comprised of 295 dentists. Table 1 shows the demographic details of the study participants, among which 156 (52.9%) were postgraduate students and 139 (47.1%) interns. Table 2 shows the responses of the study population to the questionnaire. Information regarding experience of attending a workshop on BLS, rating of oneself on BLS knowledge, reason for lack of knowledge about performing BLS and necessity of BLS to be a part of the training curriculum is graphically represented (Table 3). Table 4 shows the distribution of the study subjects according to their scores. The scoring criteria was obtained from the study done by Avabratha KS.<sup>1</sup> Almost 53% of the dentists had poor awareness about BLS. Only 3% of the dentists had very good awareness. The difference in the responses between postgraduate students and interns was statistically significant ( $p < 0.005$ )

## DISCUSSION

Today healthcare reforms are focusing mainly on the availability of the medical care for all people. As the new health reforms are emerging, the role of oral health professionals in the overall health and wellbeing of their patients is expanding. In order to possibly prevent a medical emergency, one must prepare the entire dental office. They should be confident to assess a victim and deliver effective basic medical emergency treatment when it is indicated.

Many dentists lack the knowledge of simple concepts of CPR because they are not practicing medical emergency preparedness on a regular basis. Dentists are of the opinion that medical emergencies are rare in dental clinics. Unfortunately, an unthinkable event can occur in dental setting. Hence preparation is the key to saving lives.<sup>3</sup> Thus the survey emphasized on the cognitive approach to general perception on the skills of BLS among budding dentists.

The study was conducted on the parent population as it was feasible. A whole sample is free of sampling bias, selection bias and the results can be generalized. The results of our

Whether they had attended any workshop on BLS		
	No.	%
Yes	80	27.1
No	215	72.9
Rating their awareness regarding BLS		
Poor	79	26.8
Below average	74	25.1
Average	112	38.0
Good	25	8.5
excellent	5	1.7
Probable reasons for lack of awareness regarding BLS		
Busy curriculum	46	15.6
Lack of interest	39	13.2
No professional training available	205	69.5
Need for incorporation of BLS course in undergraduate curriculum		
Yes	265	89.8
No	30	20.2

**Table-3:** Distribution of the respondents based on the responses to the open ended questions in the questionnaire

Grades	Scores	N=295	%
Very poor	Less than 4	9	3
Poor	4-8	158	53.6
Moderate	9-12	84	28.4
Good	13-16	35	12
Very good	More than 16	9	3.0

**Table-4:** Distribution of participants according to the scores

survey showed that majority of the subjects had poor awareness about Basic Life Support. The results of the survey are in line with the study conducted by K. Shreedhara Avabratha et al.<sup>1</sup> and Chandrashekar et al.<sup>4</sup>

The poor awareness can be attributed to lack of structured teaching of BLS in the curriculum. Dental school training moulds the dental graduates' opinions of their professional roles and duties and influences their future practice pattern. A survey by David Henzi<sup>5</sup> reported that the dental school clinic was often an inefficient learning environment that hindered their opportunity to develop clinical competency. The knowledge gained in dental institutions is more theoretical. There is a need for translation of the theory into practice.

Among the subjects, the post graduate students had a comparatively superior knowledge than the interns and this can be attributed to the fact that the postgraduate students are exposed to wide arena of literature making them more knowledgeable. Majority of subjects rated themselves as having average knowledge regarding BLS which is reflected by responses to the questionnaire. Almost 90% of subjects were of the opinion that BLS should be a part of undergraduate curriculum. The results are similar to the study conducted by Hassan Zaheer et al.<sup>6</sup> This can be credited to the fact that after graduation training of resuscitation skills is difficult. Busy residency schedules and lack of resources acts as a barriers. Only limitation of this study was that the practical skills of BLS could not be assessed in this study.

## CONCLUSIONS

There is a lack of awareness regarding BLS among post-graduate students and interns. Postgraduate students had comparatively better knowledge than the interns. This is a serious issue needs to be promptly visualized. Hence, hands on courses on basic life support should be encouraged so as to translate theory into practice. Scientific laboratory should be established in all colleges to teach CPR and motivate students to learn and teach these skills to laypersons.

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# Incidence of Group B Streptococci Colonization during the Third Trimester of Pregnancy in two Tertiary Care Centers in the Central Part of Kerala

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## ABSTRACT

**Introduction:** Group B streptococci (GBS) is an important cause of invasive neonatal diseases. Asymptomatic colonization of vagina with GBS may lead to vertical transmission and there by neonatal GBS diseases. Maternal GBS colonization varies with population characteristics and geographic location. This study was conducted to detect the GBS colonization in antenatal women in the central part of Kerala.

**Materials and Methods:** Vaginal and rectal swabs were collected from antenatal women of 35-37 weeks of gestation. Swabs from vagina were processed by direct plating onto 5% sheep blood agar and inoculation to Todd Hewitt broth followed by sub culture. Rectal swabs were processed by inoculation to Todd Hewitt broth and sub culturing. Identification was done by biochemical tests and confirmed by grouping sera.

**Result:** Total 442 samples were collected as vaginal and rectal swabs from 221 antenatal women. 24 women (10.8%) were found to be colonized by GBS. Of these, 23 were positive from vaginal swabs. 12 isolates obtained from both vaginal and rectal samples. 1 was positive in the rectal sample alone. 12.6 and 8.8% were positive in primi and multigravida, respectively.

**Conclusion:** The incidence of GBS colonized was 10.8% and hence the infants were at great risk of early-onset invasive disease. The observation of this study recommends a multi-center screening for the prevention of early onset GBS disease in order to reduce the neonatal infection rate significantly by intrapartum antibiotic prophylaxis.

**Keywords:** Group B streptococci, early neonatal infection, sheep blood agar, Todd Hewitt broth, vaginal and rectal colonization

## INTRODUCTION

Lancefield Group B Streptococcus (GBS) or *Streptococcus agalactiae* is a Gram positive  $\beta$  hemolytic Streptococcus. The causative role of GBS in early neonatal morbidity and mortality is well established worldwide.<sup>1</sup> 5 to 40% of pregnant and nonpregnant women carry GBS in their genital or lower gastrointestinal tract.<sup>2,3</sup> The source of the early neonatal GBS infections is the maternal genital tract from where the vertical transmission occurs.<sup>4,5</sup> The intrapartum antibiotic prophylaxis (IAP) became prevalent in 1990 s to prevent the GBS neonatal sepsis.<sup>6</sup> Centre for Disease Control (CDC) has recommended the universal screening for the prevention of early onset GBS disease and in some countries like the United States neonatal GBS infection rate was reduced

significantly by IAP.<sup>1</sup> A continued efforts are inevitable to sustain the prevention of GBS infection and to monitor for potential adverse consequences of intrapartum antibiotic prophylaxis such as emergence of bacterial antimicrobial resistance or increased incidence.

Maternal GBS colonization varies with population characteristics and geographic location. However, demographical features such as age, parity, gestational period of women were not found to have any significant influence on the GBS.<sup>11</sup> Since the GBS colonized mothers can vertically transmit the homologous serotypes of the organism to their newborns, population based study regarding its prevalence is beneficial to reduce the morbidity and mortality. It has been reported that intrapartum prophylaxis does not prevent late-onset group B streptococcal disease. Furthermore, both the prenatal and postnatal chemoprophylaxis has not been shown to be effective.<sup>12</sup> The report from our society is scant. Therefore, the present study was aimed to detect the incidence of maternal carrier state of GBS in two tertiary care centers.

## MATERIALS AND METHODS

The study was carried out in two tertiary care centers in central part of Kerala. Women of 35-37 weeks of gestation, both primi and multigravida, visited the department of Obstetrics and Gynecology during the period between Jun 2013 to Jun 2015 were included in the study. Consent was obtained from the subjects and the study was approved by the Institutional ethics committee for research. Women on any antibiotics for some other ailments and women with previous history of GBS disease in their neonates were excluded from the study. Vaginal and rectal swabs were collected. Vaginal swabs were directly plated on to 5% sheep blood agar and then inoculated to Todd Hewitt broth with antibiotics like colistin and nalidixic acid. Rectal swabs were inoculated to Todd Hewitt

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broth with antibiotics like colistin and nalidixic acid. Subcultures were done from broth on 5% sheep blood agar (SBA) after 24 hour incubation.  $\beta$  lytic colonies on SBA (Fig.1A) were subjected to catalase test, bacitracin susceptibility, Christie Atkins Munch-Petersen (CAMP) test and hippurate hydrolysis. Catalase negative, Bacitracin resistant, CAMP test positive (Fig. 1B) and hippurate hydrolysed colonies were confirmed with serological grouping (Strep check latex). Antibiotic susceptibility test was done by disc diffusion method for ampicillin (10 $\mu$ g) and erythromycin (15  $\mu$ g) and interpreted according to Clinical and Laboratory Standards Institute (CLSI) guidelines.

**STATISTICAL ANALYSIS**

Analysis was done using SPSS software version 16. Chi Square test was done. p value <0.05 was considered as significant.

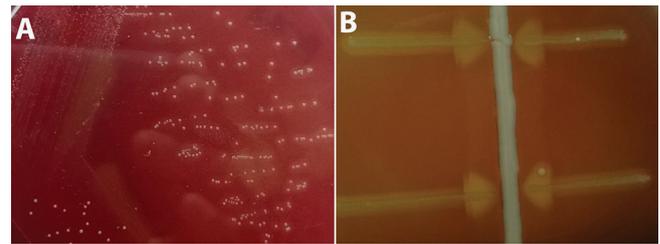
**RESULT**

Total of 442 swabs were collected from 221 pregnant women at 35-37 weeks of gestation, out of which 24 subjects were positive for GBS (10.8%) (Fig.2) (p>0.05). Eight vaginal swabs were positive on direct plating on SBA (33.3%) whereas 15 vaginal swabs were positive on subculturing from enrichment medium (62.5%) (Fig. 3). Out of 24 GBS isolates, 1 was positive only from rectal sampling. 12.6% of primigravida and 8.8% of multigravida were found to be positive for GBS colonization (Table 1). But are statistically insignificant (p>0.05). All isolates of GBS were found to be susceptible to ampicillin and erythromycin.

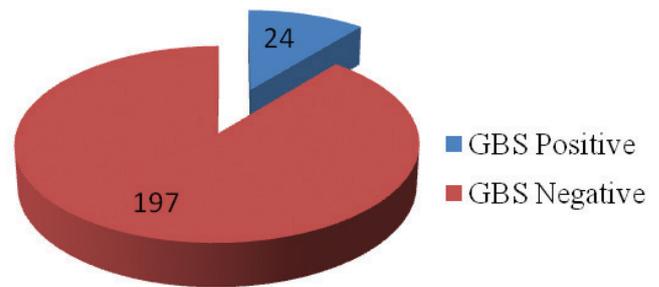
**DISCUSSION**

Maternal GBS colonization can lead to vertical transmission and early onset GBS disease in neonates. It is found to be one of the major perinatal pathogens, both for mothers and their infants, and are associated with significant morbidity and mortality that attendant cost to society. It may also result in adverse obstetric outcome like premature rupture of membrane and preterm delivery.<sup>7</sup> Even though GBS can invade intact membrane the risk of neonatal disease is more, if GBS ascends after the rupture of membrane.<sup>4,5</sup> With the CDC recommendations for antenatal screening and IAP in colonized women more studies have come out on these aspects.<sup>9,8</sup> Some Indian studies show the lower maternal GBS colonization with an average of 10%.<sup>11,13-15</sup> Our study also shows similar carriage rate (10.8%).

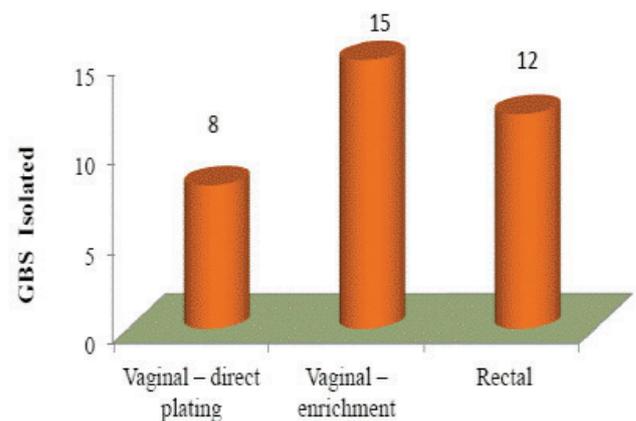
The success of GBS isolation from antenatal women depends on the methods used for sampling with better results from rectal and the media used.<sup>16</sup> We conducted the study by using vaginal as well as rectal swabs in enrichment media from 221 women of which 24 were found to be colonized. The isolation was more from the vaginal swabs than the rectal swabs. In this study, only one case was positive from rectal sampling alone. Badri et al.<sup>17</sup> reported a higher incidence in rectal as opposed to vaginal cultures which suggested that the gastrointestinal tract may be the primary site of colonization and that vaginal colonization may represent



**Figure-1:** A)  $\beta$  lytic colonies on sheep blood agar B) Christie Atkins Munch-Petersen test (CAMP) positive



**Figure-2:** Distribution of group B streptococcal colonization



**Figure-3:** Distribution of group B streptococcal infections in different samples

Gravida	No of women	Positive for GBS	Percentage
Primi	119	15	12.6
Multi	102	9	8.8
Total	221	24	10.8

P > 0.05 (Chi-Square test) non significant

**Table-1:** Distribution of Group B streptococci among the pregnant women

contamination from this source. In this study, we could isolate 12 from the rectal sampling. The colonization rate in the present study is relatively lower than that obtained in a study conducted in Karnataka where it was 12.67% from vaginal swabs.<sup>14</sup> The reason may be the difference in the geographical area and ethnic groups. GBS colonization rate in the present study was more in primigravida than multi. An Indian study showed GBS resistance to erythromycin and clindamycin.<sup>14</sup> The isolates obtained in the present study were susceptible to ampicillin and erythromycin. The participants who were positive for the GBS were given intrapartum prophylaxis

and found no complications for their babies. A screening may help to avoid the empirical exposure of large numbers of women to antibiotics.

## CONCLUSION

The incidence of GBS colonized was 10.8%. The conclusion on the carriage rate of GBS in this area is not possible without an elaborate study. The screening of GBS in antenatal women can be extended to more centers to detect the approximate carriage rate in this area in order to select the intrapartum chemoprophylaxis.

## ACKNOWLEDGEMENT

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# Cadaveric Study of Higher Division of Sciatic Nerve

Ch. Jayamma<sup>1</sup>, Padmaja Vasi<sup>2</sup>, Raju Sugavasi<sup>3</sup>

## ABSTRACT

**Introduction:** Sciatic nerve is derived from the anterior divisions of L4 to S3 in the pelvis and divides into tibial and the common peroneal nerves. The regular position of division takes place at junction of the middle and lower thirds of the thigh. Objective of the study was to find out the position of division of the sciatic nerve because it is highly variable.

**Materials and Methods:** present study conducted on 30 cadavers at Kurnool, Gandhi, Fathima medical college in south India,

**Result:** out of 60 specimens single variation (1.6%) was found and sciatic nerve was divides within the gluteal region extends to the thigh above the piriformis.

**Conclusion:** This kind of variations is important for surgeons and anesthetists.

**Keywords:** Gluteal region, Piriformis, Sciatic Nerve

## INTRODUCTION

The sciatic nerve is thickest nerve in the body which is about 2 cm wide and arises from anterior divisions of L4 to S3 spinal nerve roots. Various levels of proximal to the knee joint the nerve divides into tibial and common peroneal nerves. Majority of sciatic nerve division takes place at the junction of the middle and lower thirds of the thigh in related to the apex of the popliteal fossa. Occasionally it divides with in pelvis, such cases the common peroneal part passes through the piriformis and tibial part passes below the muscle.<sup>1</sup> High division of sciatic nerve in pelvis is the reason for nerve compression leads to piriformis syndrome.

## MATERIAL AND METHODS

Study of higher division of sciatic nerve was conducted on 30 adult cadavers both right and left sides (60 specimens) at Kurnool government medical college, Kurnool, Fathima institute of medical sciences, kadapa, Andhra Pradesh and Gandhi medical college, secunderabad, Telangana states of India. Formalin fixed cadavers were dissected according to standard dissection manual and the gluteus maximus muscle was cut and reflected to expose the sciatic nerve in related to piriformis muscle. Carefully identified the sciatic nerve location and site of division then recorded the variations.

## RESULTS

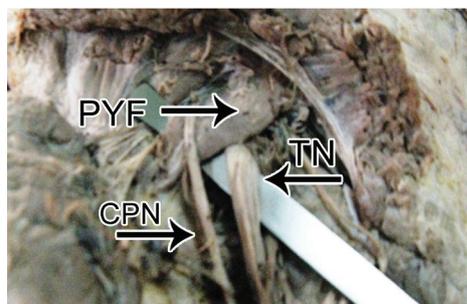
Higher division of sciatic nerve in the gluteal region with the emergence of common peroneal nerve above the piriformis and tibial nerve emerging below the piriformis was observed only in one case on left side out of 60 specimens and percentage was only 1.6% (Figure.1). Two components

of sciatic nerves passes in the thigh parallel to each other and reached superior angle of popliteal fossa, Thereafter the rest of the course of both nerves were normal.

## DISCUSSION

According to Beaton and Anson classification<sup>2</sup>, variations of the sciatic nerve related to piriformis muscle as follows; Type 1: Undivided nerve below undivided muscle, Type 2: Divisions of nerve between and below undivided muscle Type 3: Divisions above and below undivided muscle Type 4: Undivided nerve between heads Type 5: Divisions between and above heads Type 6: Undivided nerve above undivided muscle. In the present study we found 1.6% of variation is similar to Type 3 classification of Beaton and Anson. Prakash et al<sup>3</sup> observed the 2.3% of present variation where the bifurcation of sciatic nerve took place in the gluteal region itself.

Muthu kumar T et al noticed Present type c in 4 limbs 8% in Indian population.<sup>4</sup> Shailesh Patel et al observed type c variation in 5.81% of Gujarat region.<sup>5</sup> Sharma et al noticed this kind of type c variation in in 60 years male cadaver.<sup>6</sup> Guvencer et al studied variation of higher division of the sciatic nerve in related to Piriformis.<sup>7</sup> Existence of high division of the sciatic nerve may lead to failure of popliteal block by anesthesia.<sup>8</sup>



**Figure-1:** High division of sciatic nerve shows PYF: Piriformis, TN: Tibial nerve, CPN: Common Peroneal Nerve

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## CONCLUSION

The anatomical and topographic knowledge of high division of the sciatic nerve is clinically important for surgeons, orthopaedicians for diagnosis of sciatic nerve entrapment and compressive neuropathies.

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# Retrospective Study of Prevalence of Common Intestinal Parasitic Infection in Tertiary Care Centre at Kanpur

R. Sujatha<sup>1</sup>, Nidhi Pal<sup>2</sup>, Deshni Singh<sup>3</sup>, Suneet Yadav<sup>4</sup>, D. Arunagiri<sup>5</sup>

## ABSTRACT

**Introduction:** Intestinal parasitic infections are one of the major health problems in several developing countries, including India. Survey on the prevalence of various intestinal parasitic infestations in different geographic regions is a prerequisite to obtain an accurate understanding of the burden and cause of intestinal parasitic infestations in a particular area. This study was conducted to find out the prevalence of intestinal parasitic infection in rural areas in and around Kanpur.

**Materials and methods:** A retrospective laboratory analysis of stool samples was carried in a tertiary care Hospital, Kanpur. The records were collected from Microbiology Laboratory for a period of one year (July 2014 to June 2015). Stool samples were examined by direct method and concentration techniques.

**Results:** In our study the prevalence of intestinal parasitic infection is 31.9%. Age group <10 and 11-20 were infected with one or more intestinal parasites. The most common parasites identified were *A.lumbricoides* (44.9%), *Taenia spp.* (31.87%), *H.nana* (6.5%), *E.histolytica* (5.6%), *Ancylostoma duodenale* (3.7%) and mixed infection of *E.histolytica* and *A.lumbricoides* (2.8%), *A.lumbricoides* and *Taenia spp.* (4.7%) were also found.

**Conclusions:** Helminthes are more common than protozoa in our study. It is an important public health problem and is necessary to develop effective prevention and control strategies including health education. Data on the prevalence and other parasites and host related factors are fundamental in planning any rational control or eradication programme for parasites in human populations.

**Keywords:** Helminthes, Intestinal parasitic infections, Protozoa

## INTRODUCTION

Intestinal parasitic infestations have a very high prevalence in tropical and subtropical countries and the populations face substantial morbidity on this account.<sup>1</sup> Poverty, illiteracy, bad hygiene, unavailability of potable water and hot and humid tropical climate are the factors that increase the risk of intestinal parasitic infestations.<sup>2</sup> These parasites dwell in the gastrointestinal tract in humans and other animals.<sup>3</sup> Current estimates suggested that *Ascaris lumbricoides* can infect over a billion, *T. trichiura* can infect 795 million, and hookworm can infect 740 million people.<sup>3</sup> Parasitic infestations cause malabsorption, diarrhea, poor health status, also causes poor growth, reduced physical activity, poor cognitive performances, impaired learning ability in children.<sup>4,5</sup> The frequency of parasitic infestations varies with age and sex of the general population, and children aged below 10 years frequently complain of problems related to parasitic infestations, then older children.<sup>6,7</sup> It then becomes important to know the disease burden of parasitic infestations in the communities, like other developing countries, intestinal parasitic infestations are a major health problem in India. Limited data regarding this is available in literature in U.P, Kanpur, therefore we were prompted to undertake this study to know the prevalence and pattern of intestinal parasitosis in rural areas in and around Kanpur.

tations, then older children.<sup>6,7</sup> It then becomes important to know the disease burden of parasitic infestations in the communities, like other developing countries, intestinal parasitic infestations are a major health problem in India. Limited data regarding this is available in literature in U.P, Kanpur, therefore we were prompted to undertake this study to know the prevalence and pattern of intestinal parasitosis in rural areas in and around Kanpur.

## MATERIALS AND METHODS

A retrospective study was carried out in the department of microbiology for a period of one year [July 2014 to June 2015]. Patients with symptoms suggestive of parasitic infections who came to our tertiary care hospital for whom stool examination for parasites was advised by clinicians were included in the study and stool samples for bacterial culture were excluded. Stool specimens were collected in wide mouth container without any preservative and properly labelled and sent to laboratory within an hour and the stool samples were subjected to gross and microscopic examination. Saline wet mount preparation was done to detect protozoal trophozoites and helminthic eggs or larvae. Lugol's iodine mount was done to detect cysts and modified ZN stain was also performed to detect oocyst in clinically suspected or immunodeficiency cases. Saturated salt concentration and Formol-ether concentration technique was performed.<sup>8</sup>

## RESULTS

The prevalence rate of the study is 31.9%. The prevalence of parasite was more in the age group in <10 and 10-20 year 10.5% and 9.4% respectively. [Table-1] Male were having more parasitic infections (65.2%) than female (34.2%). The common isolates were helminth, *A.lumbricoides* (44.9%), *Taenia spp.* (31.8%), *H.nana* (6.5%), *A. duodenale* (3.7%) and protozoa, *E.histolytica* (5.6%). Some cases of mixed infections of *E.histolytica* and *A.lumbricoides* (2.8%), *A.lumbricoides* and *Taenia spp.* (4.7%) were also found. [Fig-1]

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Distribution of parasites among different age groups was shown in fig-2. Among male *A.lumbricoides*(29.6%) and *Taenia spp*(20.9%) more common than female 12.2% and 8.7% respectively. While *H.nana* and *A.duodenale* were more in female.[Fig-3]

**DISCUSSION**

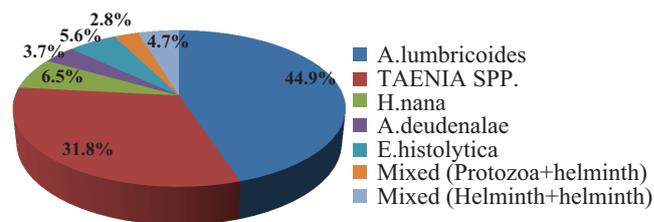
Intestinal parasitic infections have always been an important health care problem but its prevalence and severity may vary on location and period of time. The prevalence of intestinal parasitic infections among rural area in Kanpur were found to be 31.9% which is similar to Sah RB et.al. in Nepal (31.5%)<sup>5</sup> but low when compared with other studies 61%<sup>9</sup>, 75.7%<sup>10</sup> 92.7%.<sup>11</sup> Many studies from India have reported varying rates of intestinal parasitic infections such as 23.6% by Das., et al. 2007<sup>12</sup>, 24.78% by Shrihari., et al. 2011<sup>13</sup>, 26.1% by Dudeja., et al. 2012.<sup>14</sup> The campaign of anti-helminthic drug administration to the children could possibly explain the lower prevalence of helminthic infections seen in this study. Distribution of parasitic infection among different age group found prevalence of intestinal manifestation was found mostly in <10 (10.5%) and 11-20 years (9.4%) similarly Khanal LK et al<sup>15</sup> documented highest intestinal infection among 6-8 years (21.4%) followed by 9-12 years (18.6%) and Rayapu V. et.al. also seen 71% of children in age group of 11-14 years appears to have parasitic infections.<sup>16</sup> As this age group accounts for more outdoor activities and poor hygiene practices, associated with access to water is a highly probable risk factor for increased parasitic infestation among these children.

Intestinal parasitic infestation due to *A.lumbricoides*, *Taenia spp.* and *E.histolytica* was found in high among male compared to female which is contrast to other findings.<sup>17</sup> But female were more predominant infected in case of *H.nana* and *A.duodenale* in our study. The gender may not play an important role in parasitic infection but it may depend upon the region and other environmental or behavioural factors.

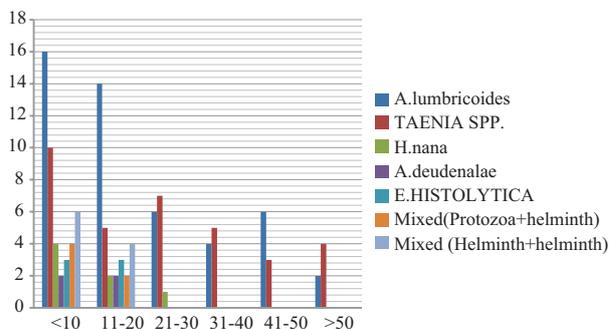
In our study helminthes were more prevalent than protozoa, in contrast Rangaiahagari A. et al.<sup>18</sup> found more protozoal infection of *E.histolytica* (30.8%), *Giardia intestinalis* (18.8%) and *Entameoba coli* (11.3%) as compared to helminthic infection. In present study helminths *A.lumbricoides* (44.9%) was highly prevalent followed by *Taenia spp.* (31.8%). Similarly other researcher found *A.lumbricoides*, more common parasite but low prevalence was reported by Singh R et al. (5.8%)<sup>4</sup> while Wani et.al.<sup>19</sup> and Kumar BH et al<sup>3</sup> reported high prevalence 69.84% and 46.8% respectively. As compared to other studies reported by Sah RB et.al.<sup>5</sup> that reported *Taenia spp.* (6.5%) was more prevalent than other parasites. Prevalence of *Taenia spp.* was high in our study as compared to other studies conducted by Kumar BH et. al<sup>3</sup>, Singh R et. al.<sup>4</sup> Khenal LK et al<sup>14</sup> found *T.trichiura* highly prevalent while Rayapu V et al<sup>15</sup> found Hookworm most common intestinal parasite. There were some studies found multiple infection of protozoa and helminth<sup>14</sup> but our studies reported 2.8% mixed infection of protozoa and helminth (*E.histolytica* and *A.lumbricoides*) and 3.7% of different helminthes

S. No.	Age	Total	Parasite present		Parasite absent	
			Number	%	Number	%
1	<10	128	38	10.5	90	24.9
2	11-20	108	34	9.4	74	20.5
3	21-30	59	19	5.3	40	11.1
4	31-40	30	9	2.5	21	5.8
5	41-50	21	9	2.5	12	3.3
6	>50	15	6	1.7	9	2.5
Total		361	115	31.9	246	68.1

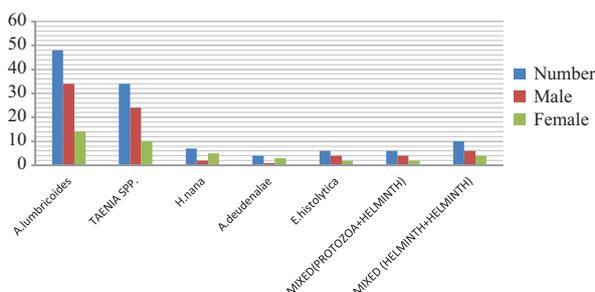
**Table-1:** Parasite present among different age groups



**Figure-1:** Distribution of parasites



**Figure-2:** Distribution of parasites among different age groups



**Figure-3:** Distribution of Parasites Among Males And Females

(*A.lumbricoides* and *Taenia spp.*). This indicates high soil contamination with helminthic parasites and water contamination. The lack of awareness about personal cleanliness and hygiene and illiteracy among rural population in Kanpur also be the reason of high prevalence of parasitic infection. In present study *Trichuris trichura*, *Enterobius vermicularis*, *Giardia lambia* were not found.

**Limitation of the study:** Firstly, single stool was examined for detection of intestinal parasitic infections, instead of multiple stool samples. Optimal laboratory diagnosis of intestinal parasitic infections requires the examination of at least three stool specimens collected over several days.<sup>7</sup> Secondly, it was planned to conduct stool sample testing within 2 h of collection; however, due to logistic constraints, it was

delayed at times from 3 to 6 hours has a result of which we could not detect some of the invasive intestinal parasites.

## CONCLUSION

The present study reveals that intestinal parasitic infections are abundant among children of rural area of Kanpur. This situation strongly calls for control measures, including treatment of infected individuals, improvement of sanitation practices and provision of clean water. The impact of each measure would be maximized through a health education program to promote hygiene practices and improved health among children and to strengthen the education program directed at children and their mothers in particular, and to communities in general.

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# Usefulness of CECT Abdomen in the Diagnosis and Treatment of Chronic Appendicitis in Children

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## ABSTRACT

**Introduction:** Chronic pain abdomen of right lower quadrant is quite common in children, but difficult to arrive at a correct diagnosis. Most of the time the clinical diagnosis points at the possibility of chronic appendicitis. Evaluations of these patients by ultrasound is inconclusive. In the study we tried to find out the role of CECT abdomen in the diagnosis and management of chronic appendicitis.

**Materials and methods:** The study was conducted in the Dept. of Surgery, Kalinga Institute of Medical Sciences, Bhubaneswar between from January 2012 to December 2014, included 30 patients presented with chronic RIF pain. Ultrasound abdomen was normal and CECT abdomen was done to exclude appendicular pathology. Based on CECT findings 18 patients were diagnosed as having chronic appendicitis and 12 patients had normal appendix.

**Results:** All the 18 patients of chronic appendicitis had undergone lap. appendectomy whereas 12 patients with CECT findings of normal appendix were offered conservative treatment. Histopathology correlation with CECT findings revealed evidence of chronic appendicitis in 14, acute in 2 and normal appendix in 2 patients. In the followed up period upto 1 year, one patient persisted to have recurrent pain abdomen in the operated group, whereas 2 patients in the conservative group continued with non specific pain abdomen.

**Conclusion:** Suggested correlation with histopathology and clinical criteria indicates that CECT abdomen can be taken as an useful investigation in diagnosis and management of chronic appendicitis in children.

**Keywords:** Chronic appendicitis, CECT abdomen, lap. appendectomy, RIF pain

## INTRODUCTION

Chronic appendicitis has been well documented in literature, but its diagnosis and treatment options still remains controversial. The exact cause is not known, but is thought to be secondary to partial and transient obstruction of the appendix.<sup>1</sup> Diagnosis of chronic appendicitis is often confusing, thereby treatment is delayed. Though CECT abdomen is considered to be the best test for diagnosis of acute appendicitis, its role in chronic appendicitis is not clearly defined. In past these patients were being treated with surgery based on clinical evidence with very high rate of negative appendectomy. Now a days with evidence based medicine the role of imaging studies is very important to arrive at a preoperative diagnosis. In this context we tried to interpret the CECT abdomen findings as chronic appendicitis where radiological feature of appendix doesn't fit into the criteria for diagnosis of neither acute appendicitis nor normal appendix. Although Shah et al 2013 pointed out that CECT abdomen the best

imaging modality in suspected chronic appendicitis<sup>2</sup>, it lacks universal acceptance. Further in this study we have tried to correlate the justification of our CECT interpretations with that of histopathological findings of appendectomy specimen and clinical improvement of our operated patients in follow up period of 1 year. Our findings suggest that CECT abdomen is a very useful investigation even in chronic appendicitis. In spite of more financial implications and risk of exposure to radiation, it helped us in planning surgery in many patients. We could find a good correlation (up to 77.7%) between the histology of appendectomy specimen and CECT interpretations. In our opinion CECT abdomen should be considered as an important investigation for diagnosis of chronic appendicitis and also it can avoid negative appendectomy.

## MATERIALS AND METHODS

The study was performed in the department of Surgery, Kalinga Institute of Medical sciences, Bhubaneswar from January 2012 to December 2014. Patients in the age group of 2-14 yrs with chronic or recurrent episodes of mild RIF pain for more than 3 weeks were included in the study group. In these patients clinical features were quite varied and atypical. Chronic appendicitis usually presents as a less severe, nearly continuous abdominal pain lasting longer than typical 1-2 day period, and often extending to weeks, months or even years.<sup>3</sup> Most of these patients had been treated by physicians (paediatricians) and then referred for surgical opinion. Detail history including the repeated episodes of pain and reason for referral were noted. These patients were then evaluated as inpatient group with blood investigations like CBC, CRP, Blood urea, Serum creatine, RBS, Serum amylase, LFT to rule out the other reasons for chronic pain abdomen. Urine routine microscopy and ultrasound were also done routinely in all patients. Patients having normal blood, urine and ultrasound report were subjected to CECT

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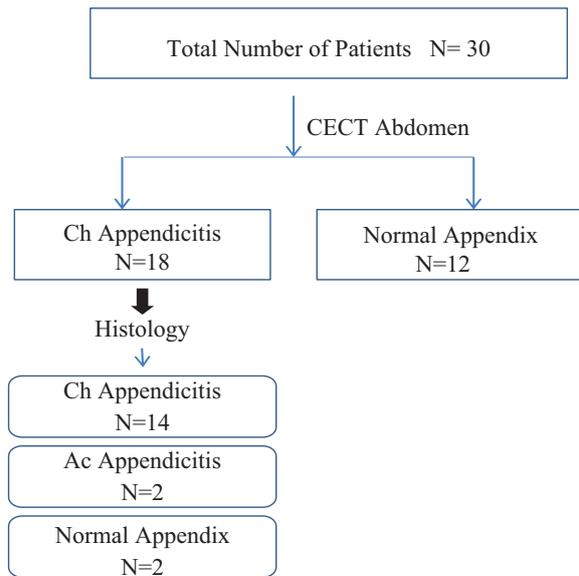
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evaluation to find out the cause of chronic right iliac fossa pain in order to exclude appendicular pathology. There were 30 patients in the study group, 18 males and 12 females. The mean age of presentation was 8 years. Based on CECT findings of recurrent or chronic appendicitis, laparoscopic appendicectomy was performed in 18 patients and the appendix specimen was subjected to histopathological examinations. The other group (12 patients) where CECT abdomen showed normal appendix received only conservative treatment as a case of nonspecific pain abdomen with IV antibiotics ceftriaxone, amikacin and metrogyl for a period of 5-7 days and discharged home. Both the group of patients (laparoscopic appendicectomy and conservative) were followed up to 1 year for either complete cure or recurrence of pain. CECT findings of chronic appendicitis patients were compared with that of histopathological findings. CT scan abdomen was taken as confirmatory evidence before taking up decision to do surgery. The following CECT criteria's were used for diagnosis of chronic or recurrent appendicitis like- subtle appendicular wall thickening with enhancement, and replacement of intraluminal air by fluid. Based on clinical presentation of chronic or recurrent pain abdomen, lack of significant mesenteric adenopathy possibility of chronic appendicitis was considered. Histopathological criteria for diagnosis chronic appendicitis were based on lymphocytic infiltration of the lamina propria, significant lymphoid hyperplasia, fibrosis, serosal adhesions, luminal obstruction, or dilatation. Similarly the H/P diagnosis of acute appendicitis was based on infiltration of granulocytes into the epithelial mucosal layer or deeper.

All these eligible patients enrolled for the study as per clinical and CT scan criteria were subsequently informed about the study background and protocol. Written informed consent was taken before definitive enrolment in the study. The study was approved by the ethical committee, KIIT University.

## RESULTS

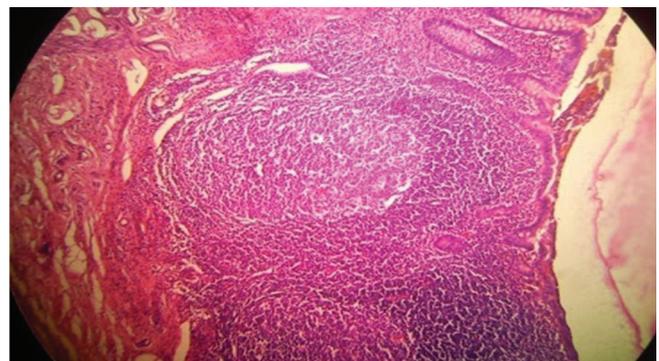
30 patients with chronic pain in the right iliac fossa were included in the study group. 18 male and 12 female with mean age of presentation 8 years. The age group with maximum number of 20 patients were within 6-10 yrs. CT scan of abdomen was done in all such patients. Based on the CT scan report, 18 patients had findings suggestive of chronic appendicitis and rest 12 patients had normal appendix (Fig 1). In our patients, CT evidence of chronic appendicitis was subtle wall thickening with enhancement and presence of intraluminal fluid (fig 2). Laparoscopic appendicectomy was done in all such 18 patients and appendix specimen was sent for histopathological examination. Histopathological examination revealed pathological evidence of chronic appendicitis in 14 patients (fig. 3), acute appendicitis in 2 patients and normal appendix in 2 patients. On follow up to 6 months, all the 18 patients were pain free except mild pain in 1 patient. Similarly, rest 12 patients of normal appendix had no recurrence of pain except nonspecific pain in 2 patients. (fig 4). There was no postoperative complications or mortality.



**Figure-1:** Flow chart of study



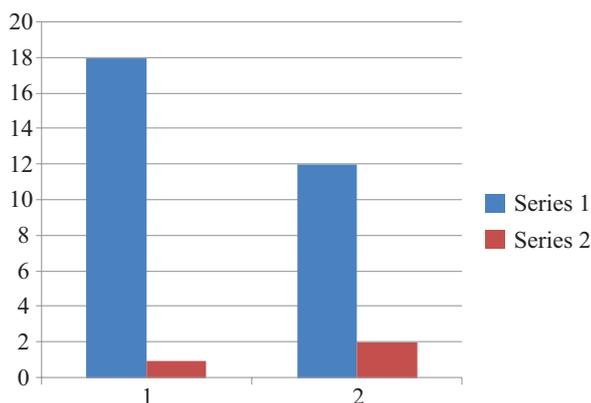
**Figure-2:** Axial CECT shows mildly dilated appendix with minimally thickened wall, which shows post contrast enhancement. intraluminal fluid seen



**Figure-3:** Photomicrograph showing intact epithelium and large lymphoid follicles, H & E, 200X

## DISCUSSION

Recurrent pain abdomen is really a difficult entity to treat particularly in children. Symptoms and signs are mostly vague. Only localisation of pain and mild tenderness in RIF arouses suspicion regarding the possibility of a chronic or



**Figure-4:** Pain in different group of patients, Series 1-lap.appendicectomy. Series2-Normal group

current appendicitis. Sometimes these types of symptoms respond to iv and oral antibiotics and reappears off and on. Parents and relatives move from one doctor to another in view of complete cure of their child. In that situation, the correct diagnosis and cure by surgery carries a lot of challenge for the surgeon. In the present day practise of evidence based medicine, one has to justify the treatment option and subsequent result. For us CECT abdomen helped in planning the treatment options in more than 90% of patients (27 out of 30 patients were pain free). Clinical and radiological diagnosis of ch.appendicitis remains a controversial subject. In CECT subtle wall thickening with enhancement and replacement of intraluminal gas by fluid was taken as a criteria for diagnosis of chronic or recurrent appendicitis. Continuous symptom duration of more than 3 weeks (chronic appendicitis) or previous episodes of similar symptoms (recurrent appendicitis) occur in 6% and 13% of patients with appendicitis referred for CT.<sup>4</sup> In our series, based on the CT scan findings, 18 patients had findings suggestive of chronic appendicitis and had undergone lap.appendicectomy. Histopathological examination revealed chronic appendicitis in 14 patients, acute appendicitis in 2 patients and normal appendix in 2 patients. Appendicitis in children is still a difficult diagnosis, researchers found that 60.5% of children had equivocal clinical findings, 14.7% had negative appendectomies, and when an imaging protocol was used 4.1% of cases had negative appendectomies. After implementation of an imaging protocol using US and CT, the perforation and negative appendectomy rates decrease.<sup>5</sup> In our series, 18 patients had CT scan evidence of chronic appendicitis and 14 patients had good correlation of ch.appendicitis on histopathological evaluation (77.7%).

Imaging that aides in the diagnosis of chronic appendicitis include barium enema, ultrasound abdomen and contrast CT scan of abdomen. Barium is rarely used now a days, ultrasound abdomen the most frequent first hand investigation, but CT scan of the abdomen is considered the most accurate imaging modality of choice for diagnosing and excluding appendicitis with an overall accuracy ranging from 93% to 98%.<sup>6-7</sup>

The precise aetiology is unknown, but chronic appendicitis is secondary to partial and persistent obstruction of the

appendiceal lumen.<sup>9,1,2</sup> In such case, luminal secretions accumulate until they are subsequently released.<sup>6</sup> The causes of intermittent or partial appendiceal obstruction include fecolith, tumors, lymphoid hyperplasia, foreign bodies, and appendiceal folding.<sup>6,7</sup>

A case series by Rao and colleagues described chronic inflammation of the appendix noted to have lymphocytic and eosinophilic infiltration, fibrosis and granulomatous reaction, and foreign body giant-cell reaction.<sup>6</sup> Mattei and colleagues considered that the fibrous obliteration of the lumen may be secondary to acute inflammation of the appendix that remained subclinical or resolved spontaneously.<sup>9</sup>

In our study of CT criteria of ch.appendicitis, histopathology had the features of ac. appendicitis and normal study in 2 patients each, other than ch.appendicitis in rest in 14 patients. The exact reason for normal study in 2 patients is not known, but all patients up to 1 year follow up were completely pain free except mild pain in one patient. In the other conservative group of 12 patients with normal appendix, only 2 patients had nonspecific pain in the follow up period. In a case study by Fayez et al, 63 patients who had appendicectomy for chronic RLQ pain and histopathology of the removed appendices revealed abnormality in 92% patients and 95 % of these were completely cured. It is concluded that chronic appendicitis does exist and could be the cause of chronic RLQ pain.<sup>10</sup> The incidence of chronic appendicitis is estimated at 1.5% of all cases<sup>11</sup>

In this case study, only 3 patients continued to have mild pain in the right lower quadrant. one patient who underwent lap appendicectomy and two patients in the other conservative group. In this regard CECT proved to be fallacious in 10% cases.

Although the clinical data on pain relief following appendicectomy are convincing, the histopathological results are difficult to understand particularly in this context of normal findings. Published figures on the correlation between symptomatology and histopathology are inconsistent.

CECT abdomen of the patients in our series showed an appendix that has neither a normal appearance, nor the appearance in favour of acute appendicitis. These group of patients exhibit an appendix having mild wall thickening (1-2mm) that shows subtle enhancement, intraluminal fluid, normal peri appendiceal fat and prominent ileocolic lymph nodes. Patient having these radiological features when underwent appendicectomy revealed chronic inflammation of appendix in most of these cases.

There are very few articles which describe the CT findings in chronic appendicitis. The above described findings on CT scan can be considered reliable for chronic appendicitis and appendicectomy should be considered in these group of patients, which was proved to be curative in our series. CT scan also helps in planning the treatment options in deciding the group of patients who would benefit the most from surgical treatment.

## CONCLUSIONS

Although laparoscopic appendicectomy is a feasible and

safe procedure, diagnosis is challenging and decision to do surgery is difficult. Chronic recurrent appendicitis should be considered in differential diagnosis in the evaluation of a child with chronic RIF pain. CECT criteria of subtle wall thickening with enhancement and replacement of intraluminal air by fluid as the diagnosis criteria for ch.appendicitis and its subsequent correlation with histopathological and clinical criteria suggested that CECT abdomen can be a useful diagnostic aid in these patients of chronic appendicitis.

## ACKNOWLEDGEMENTS

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# Study of Correlation Between Microalbuminuria and Ischemic Stroke

Goornavar SM<sup>1</sup>, R Pramila Devi<sup>2</sup>, HY Samrat<sup>3</sup>

## ABSTRACT

**Introduction:** Microalbuminuria has been extensively studied in the western countries and has been co related to Hypertension and diabetes. Aims and Objectives of the study were to study the profile of microalbuminuria in cases of acute non hemorrhagic stroke i.e less than 24 hours, to study the correlation between microalbuminuria and other risk factors for non hemorrhagic stroke and to study the prevalence of microalbuminuria in major subtypes of non hemorrhagic stroke.

**Material and Method:** A total number of 104 cases were studied. The patients with possible kidney disease, endocrine disease, Liver disease, NSAID abusers etc were excluded from the study. The 24 hour urine sample was collected and sent for microalbuminuria estimation and the values were expressed in mg/dl. At the end results the patients were grouped into 2. The Group A consisted of the patients with microalbuminuria and the Group B were the patients without microalbuminuria. Then the 2 groups were correlated with respect to the age, gender, GCS, Lipid profile, ECG and smoking history.

**Results:** There were total of 104 cases included in the study according to the inclusion criteria, and out of which the patients with microalbuminuria were 47 (45.19%) and the number of patients were 57 (54.81%). These patients were divided into Group A (Microalbuminuria Positive) and Group B (Microalbuminuria Negative). The mean age in the Group A were (61.9±15.9), and the mean in Group B was (64.14±12.8). In the Group A the number of males were 31(66%) and females were 16 (34%), and in the Group B the males were 39 (66.4%) and females were 18 (31.6%). These two groups compared for the mean urine microalbumin excretion in group-A (110.7 ± 65.4), mean UAE in group-B (13.3 ± 8.6) and mean GCS in group-A (13.8 ± 1.5), in group-B (14.82 ± 0.3). Among them the number of Smokers were (14) in group A, and in group B were (9). The mean triglycerides levels were (95.49) in both the groups, the mean total Cholesterol levels were (139.23) in both groups whose correlation to microalbuminuria were insignificant.

**Conclusion:** There was no significant correlation between the levels of the total cholesterol and the triglyceride levels and the microalbuminuria among both the group and also there was no significant co relationship between the presence of microalbuminuria and the in patients with or without microalbuminuria. There was no significant correlation between the presence of ECG changes and the presence and absence of microalbuminuria.

**Keywords:** Diabetic, Acute ischemic stroke, Microalbuminuria, Prevalence, GCS, ECG, Smoking, Triglyceride, Total cholesterol, Lacunar.

## INTRODUCTION

Microalbuminuria is excretion of the albumin in minute quantity which is not detected with normal dipstick method. it is estimated to be excretion of 30 - 300 micrograms of albumin in urine and has been called as microalbuminuria.

Microalbuminuria is defined as levels of albumin between 30 - 300 mg per day (equivalent to 20 to 200 µg/minute in a timed overnight urine collection, 20-200 mg/L on spot urine specimen or ACR 2.5 to 25 mg/mmol in males or 3.5 to 25 mg/mmol in females).<sup>1</sup>

Ischemic stroke is defined as the acute onset in neurological deficit following sudden occlusion of blood supply to the brain tissue due to any cause. Many studies have been published in the past demonstrating the interaction between the microalbumin excretion and the small vessel damage. which would have manifested and involving the heart, the kidneys and the brain. This cerebro-renal interaction has been implicated with small vessel damage, the cerebral and glomerular small vessels might have a common soil of pathogenesis, as these organs are closely connected to each other through anatomic and vaso-regulatory similarities since small vessel disorder is a systemic disorder information about damage in one organ may be provided by damage through another organ.<sup>2,3</sup>

As in kidneys the prime markers of damage would be proteinuria and microalbuminuria and also reducing estimated glomerular filtration rate. where as in the central nervous system the imaging studies like MRI etc has been the mainstay for diagnosis as in small vessel ischemic changes. Advancing age and the Male predominance has been exhibited for the prevalence of microalbuminuria. And the population of Great Britain has shown wide spectrum in the levels of microalbumin. It has also been proven to show increase in the microalbumin excretion in the African-American population.<sup>4,5</sup> One of the western studies the prevalence was found to be 46.7% in acute stroke, 16% of the patients has a history of stroke and 16.7% of control.<sup>6</sup> Whereas in an Indian studies it has been found out that the incidence of microalbuminuria was found to be about 68% which is

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much more than the incidence compared to that of the western population, there was a positive correlation between the incidence and stroke in the patients of age >60 years with male predominance (72.72%).<sup>7</sup>

There is plenty of documented evidence that not only the albumin excretion but also microalbumin excretion which is associated with a higher incidence of cardiovascular mortality and morbidity. It is also important to note that not only the diabetics but also the hypertensive patients and also the general population as well, that MA is the early marker for future cardiovascular events and target for early detection and intervention to prevent long term morbidity.<sup>8</sup> Although several studies have attempted to define the prevalence of microalbuminuria in essential hypertension, the exact figure is still unclear. The published prevalence of microalbuminuria in hypertensive subjects ranges from 4.7% to 58.4%.<sup>9,10</sup> In more recent studies of hypertensive subjects without established cardiovascular disease or renal impairment suggested that microalbuminuria, measured on a single occasion by 24-hour collection, is present in 23-27% of the studied population while less than 1% of the subjects had gross proteinuria.<sup>11-13</sup> Levels of albumin in the urine can be expressed as a concentration or as a ratio of albumin-creatinine. Albumin in the urine at levels exceeding 300 mg/day (> 200 mg/L in a spot specimen or albumin-to-creatinine ratio (ACR) > 25 mg/mmol) is regarded as macroalbuminuria (or gross proteinuria). This state of increased excretion of proteins in the urine usually reflects deterioration of kidney function.<sup>14,15</sup> There are also some of the confounding factors which might affect the levels of microalbuminuria like Exercise, UTI, protein diet, Infections and inflammations, pregnancy renal impairment, hypertension etc which needs to be ruled out.<sup>16-18</sup>

Many of the western studies have evidently proven the association of urine albumin excretion and cerebral ischemia. Whereas there is lacking Indian data in the same subject.<sup>19</sup> Aims and Objectives of the study were to study the profile of microalbuminuria in cases of acute non hemorrhagic stroke i.e less than 24 hours, to study the correlation between microalbuminuria and other risk factors for non hemorrhagic stroke and to study the prevalence of microalbuminuria in major subtypes of non hemorrhagic stroke.

## MATERIALS AND METHODS

The study was done on the patients presenting with history of Acute ischemic stroke to Hanagala Shri Kumareshwar Hospital And Research center, Bagalkot. The patients who present with history of acute ischemic stroke within 24 hours of the onset of symptoms, and the diagnosis confirmed by the CT scan. It was the Case series Study done for the period of 1 year, From November 2013 to October 2014.

**Selection of study groups:** The patients with history of acute ischemic stroke presenting within 24 hours of the onset of symptoms and the diagnosis being compared by computed tomography scan of brain, and also subjected to stroke protocol wherever necessary will be included in the study.

The Exclusion criteria included: Kidney disease with etiolo-

gy of both acquired and congenital, Liver disorders, Chronic inflammatory gastrointestinal disorder, Neoplasm, Endocrine Disorders, Dyslipidemias, Those on NSAIDs or other immunosuppressant and other Nephro-toxic drugs, Fever, or any other focus of infection, Inflammatory Rheumatic disease, Hypertension etc.

All the patients were screened for the presence of symptoms that gives a clue of possible CVA especially were attended and the detailed history was taken regarding the time of onset and the progression of the disease with respect to the neurological deficits.

The detailed neurological examination was done to assess the extent of the neurological deficits on the patients. On arrival the baseline sugars were taken with Glucometer and monitored further throughout the course in the hospital as and when required, and also the Electrocardiogram was also taken.

The diagnosis of the Ischemic stroke was confirmed by the computed tomography of brain or even followed with the stroke protocol as and when required. And the size of infarct was differentiated into Lacunar or major artery involvement (non Lacunar) as per the diagnostic criteria of Department Radiology. Most patients with poor GCS or with extensive neurological deficits were cauterized with Foley's catheter and the 24 hour urine collection was subjected to the microalbuminuria estimation. The microalbumin is estimated using Erba 5X Chem Semi Auto analyzer, by Kinetic method and is expressed in ....mg/day. The kits were also supplied by Erba Pvt Ltd.

The most frequently utilized techniques for detection of microalbuminuria are *The immunoassays*. Non-immunological techniques for quantifying microalbuminuria have also been used. These tests are mainly chromatographic techniques such as size-exclusion *high performance liquid chromatography* (HPLC).<sup>20,21</sup>

The patients urine protein excretion value between 30 and 300 per day was taken to be positive for Microalbuminuria.

The ECG changes were studied with respect to standard criteria to identify the ischemic changes. The Glassgow coma scale was also accessed according to the standard scaling. Taking Eye Opening, Verbal and Motor responses into consideration.

A fully informed consent was obtained from all the study subjects, having been explained regarding the study the patients involved and the bearable expenses. Study was proceeded only on obtaining a fully informed consent.

The parameters of the study were confined to only the estimation of MA, the functional outcome and death or further follow up could not be obtained during the study. Since this is a tertiary center there is a possibility of an anticipated selection bias especially with the seriously ill patients. For which the study settings may have had to be widened.

## STATISTICAL ANALYSIS

Statistical analysis was done using SPSS Software, version 18. Percentages and proportion were used for qualitative data, Chi square for association. Mean and standard deviation for

quantitative data, unpaired student 't' test for differences. P value <0.05 was considered as statistically significant.

### RESULTS

As per the minimum sample sizing a total of 104 patients of Acute ischemic stroke were studied. Among these patients 47 patients had the presence of Microalbuminuria and the rest of the 57 had no Microalbuminuria. Since for comparison purposes the entire study group was divided into two groups:

Group A: Patients with Microalbuminuria

Group B: Patients without Microalbuminuria.

Hence the Group A consisted of a total number 47 patients and the Group B consisted a total of 57 Patients of all the age groups and gender.

All the baseline characteristics of both Group A and Group B was observed and the mean was calculated and was presented on the following table.

These two groups compared for the mean urine microalbumin excretion in group-A (110.7 ± 65.4), mean UAE

	Group B MA Negative (mean SD)	Group A MA Positive (mean SD)	t	p
Age	64.14 ± 12.8	61.9 ± 15.9	0.78	0.43
Pulse	84.3 ± 11	80.7 ± 10.5	1.68	0.09
Sys.BP	130.39 ± 13.2	130.55 ± 11.6	0.06	0.94
Dia.BP	82.9 ± 9.8	82.2 ± 7.8	0.37	0.71
GCS	14.82 ± 0.3	13.8 ± 1.5	4.68	0.0001
RBS	132.1 ± 28.8	129.4 ± 27.6	0.48	0.62
S Creat.	1.0 ± 0.29	1.01 ± 0.28	0.19	0.84
B Urea	30.8 ± 13.5	35 ± 14.3	1.52	0.13
Trigly	94.4 ± 21.1	86 ± 27.5	1.75	0.08
T Chol	151.2 ± 35.6	141.0 ± 43.7	1.3	0.196
MA	13.3 ± 8.6	110.7 ± 64.4	11.11	0.0001
Hb%	11.6 ± 1.4	11.7 ± 1.52	0.47	0.63

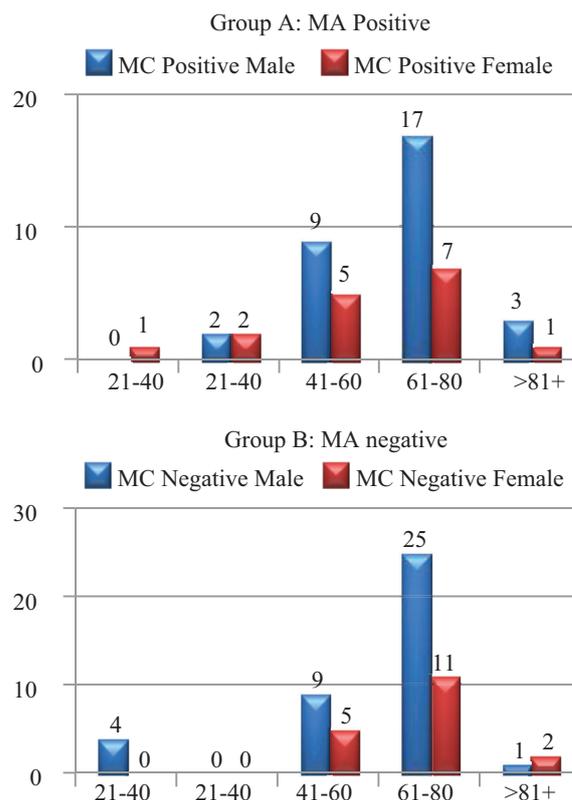
**Table-1:** Baseline characteristics of all the basic components of the studies.

Age (Years)	Group B: MA Negative		Group A: MA Positive	
	Male (No%)	Female (No%)	Male (No%)	Female (No%)
21-40	4(100%)	0	0	1(100%)
21-40	0	0	2(50%)	2(50%)
41-60	9(64.3)	5(35.7%)	9(64.3%)	5(35.7%)
61-80	25(69.4%)	11(30.6%)	17(70.8%)	7(29.2%)
>81+	1(33.3%)	2(66.7%)	3(75%)	1(25%)
Total	18(31.6%)	39(68.4%)	16(34%)	31(66%)

**Table-2:** Age wise distributions of the studies subjects.

Study	Sample size	Prevalence in %	Year of Study
Muralidhara N et al	116	47.91%	2015
Muhammad Ahsan et al	195	48.2%	2013
PC Mathur et al	50	68%	2005

**Table-3:** Showing the comparison of the prevalence from the previous studies in the Indian settings.



**Figure-1:** Genderwise distribution of the studies subjects in Group A and Group B.

in group-B (13.3 ± 8.6) and mean GCS in group-A (13.8 ± 1.5), in group-B (14.82 ± 0.3). There was a clear statistical significance of the GCS <0.0001 and the Presence or absence of the microalbuminuria. Which was taken to be a prognostic index for the survival of the patients and the neurological outcome of the same. The Lower the GCS and the presence of the microalbuminuria the poor was the outcome the disease state.

The age and sex wise distribution of the studied subjects was estimated that the maximum number of male and female patients of both the Group A and Group B were in the age group of 61-80 years. and there was a demonstrable male preponderance among the presence of the microalbuminuria as depicted in the following tables.

With the group A and group B patients there was a obvious male preponderance and also there was demonstrable incidence of ischemic stroke which was more in the males.

The Subjects were also subjected to comparison with respect to other parameters like the dylipidemia, the presence of ischemic changes in on ECG, and the history of smoking. It was also observed for the patterns of the microalbuminuria in the patients with 2 major subsets of ischemic stroke i.e Lacunar strokes and Non lacunar stroke( Large vessel involvement) and Combined stroke.

The Triglyceride values and the values of the Microalbuminuria for both Group A and Group B was estimated, the mean triglycerides levels were (95.49) in both the groups, the mean total Cholesterol levels were (139.23) and statistical significance was not significant with the p value being 0.17.

Total cholesterol with the Microalbuminuria of both Group A and Group B patients, since the p value being 0.86 it was thought to have no significance. Some of the patients had ischemic changes in ECG, among both the Group A and Group B and was compared with the estimated microalbuminuria, with the p value of 0.48 it was proved not significant hence the presence of ECG changes had no correlation with the presence of microalbuminuria. The smoking being one of the risk factor for stroke, all the patients were asked about the history of smoking, the smoking group of patients were present in both group A and B and the number of Smokers were (14) in group A, and in group B were (9) they were compared with the presence and absence of microalbuminuria and the p value was estimated to be 0.08 hence was declared to be of no statistical significance.

All the cases were divided according to the 2 major subtypes of the ischemic stroke as Lacunar or Small vessels ischemic changes and Large vessels involvement or the non Lacunar infarct according to the Radiological protocol with CT or MRI brain findings. Among the patients with positive microalbuminuria the ratio to Lacunar and non lacunar were 23:28, and among the negative Microalbuminuria group the number of lacunar and non lacunar were 18 and 21, and with combined CT findings the number was 6 and 8 among the microalbuminuric and non microalbuminuric cases respectively. The correlation was tabulated with the p value of 0.97 and was not statistically significant.

## DISCUSSION

The prevalence and the association of the microalbuminuria in the event acute ischemic stroke has been successfully proven with statistical significance in many of the western studies and in a few recent Indian studies. Keeping this in mind this study was taken up with Study sample of 104 patients for having filtered them using the exclusion criteria.

Also there was a well anticipated selection bias especially considering the seriously ill patients, and also the prognosis of those patients and the functional outcome of the neurological deficit and even the possibility of the death could not be followed up. And the patients on follow up visits were also not re-estimated for MA, to know the disease process and the behavior of the albumin excretion in urine.

### Prevalence of Microalbuminuria

In our study the prevalence of microalbuminuria was 47 among the 104 patients, which is about 45.19 %. Which was also confirmed about by some previous Indian studies. as depicted in the following table.

In the above studies the patients had the same risk factors profiles and it depicts a slightly higher prevalence of Microalbuminuria in acute ischemic stroke.<sup>7,22,23</sup>

With different study samples the total percentage prevalence was estimated for them to be higher compared to our studies. And also these studies have show significant correlation statistics to other risk factors like hypertension and diabetes etc.

### Prognostic significance of microalbuminuria

In our study the mean GCS was 13.8±1.5 among the MA positive patients, and it was 14.82±0.3 among MA negative patients. Which clearly states that the GCS was significantly lower in patients with MA when compared to patients without MA. p value of 0.0001.

Hence presence of microalbuminuria proves to be an important marker for prognosis in ischemic stroke. It May serve as a assessment marker in case patients requires aggressive medical intervention.

### Age Gender and MA

In this study microalbuminuria we have compared Age Gender and presence of MA. In many of the studies it has been significantly proven to have correlation between age and MA.

No significant correlation was found between the age and the extent of MA among the group A and group B. Furthermore the age was divided into < 60 years and > 60 years. In both the groups it was found out that the number of patients were significantly high in the age group of more than 60 years, than below 60 years.

Whereas other studies also inferred that there is significant male preponderance and more number of patients in the age group of more than 65 years. But does not give any significance regarding the prognostic value or the outcomes of the same when compared to the age and the gender. In our study we did not establish any significant correlation between the age and the GCS. Similarly there was no correlation between the sex and GCS as well. Some of the studies have suggested the severity of the age and GCS and the extent of neurological deficits. In our study there was no significant correlation established between the patients with ECG changes s/o IHD. Both Group A and Group B there were patients with e/o ECG changes, but no conclusion could be drawn about the correlation with MA.

Also the patients of group A and Group B were had patients with history of Smoking, although no correlation was established with respect of GCS and MA. The Sizes of the infarcts of all the patients was studied according to the radiological protocol, as lacunar(Small vessel ischemic changes) and non lacunar(Major vessel involvement). Among the Group A the number of patients with lacunar infarcts was 23 and the non lacunar infarcts were 18 and some of the patients had both changes combined were 6 in number. And the Group B had the Lacunar infarct cases of 28, and the Non lacunar changes of 21 patients, and combined changes of 8 patients. The statistical analysis was done and the no significant correlation was inferred. Hence the size of the infarct had no correlation in patients with or without MA.

## CONCLUSION

Presence of MA was significantly correlated to the Glasgow coma scale for assessing the prognostic significance. Lower the GCS the prevalence and the values of the MA were more. There was no significant correlation between the Age and the presence of MA, even among the subdivided age groups with

60 years as a demarcation. There was no significant gender discrepancy with the presence of MA. There was no significant correlation between the presence of ECG changes and the presence and absence of MA. But the prevalence was still high among the patients with ECG changes. No significant correlation was withdrawn from the presence of smoking history and the presence of MA, but the prevalence was high among the males. Also there was no significant relationship was established between the lipid parameters and MA.

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# A Relevance of Lipid Changes in Hypothyroidism Patients Associated with and without Metabolic Syndrome

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## ABSTRACT

**Introduction:** Thyroid hormones appear to serve as a general pacemaker accelerating metabolic process and may be associated with metabolic syndrome. Metabolic syndrome (MetS), a cluster of disorders including central obesity, glucose intolerance, hypertension and dyslipidemia, has been used to identify individuals at risk of cardiovascular disease (CVD).

**Material and Methods:** A total of 81(cases 51, control 30) hypothyroid patients with age and gender matched were recruited as control group. Lipid profile and thyroid profile were investigated by using standard procedures.

**Results:** Lipid profile consisted of TC, TG, VLDL-C, LDL-C and ratios of TC/HDL-C and LDL-C/HDL-C showed statistical significantly raised ( $P < 0.0001$ ) whereas HDL-C observed decreased ( $P < 0.0001$ ) as same manner in total hypothyroid patients than control group. In case of thyroid profile T3 and T4 showed statistical significantly decreased as HDL-C ( $P < 0.0001$ ) while TSH levels found significantly higher in hypothyroid patients than control group. The significant changes were found in some variable on comparison between with and without metabolic syndrome groups of subclinical and overt hypothyroidism patients.

**Conclusion:** This study on metabolic syndrome in thyroid dysfunction population may help us to plan management strategies, resulting in significant reduction in cardiovascular morbidity and mortality due to metabolic syndrome.

**Keywords:** Hypothyroidism, Metabolic Syndrome, Lipid Profile and Thyroid Profile

glucose. Thyroid dysfunction is a risk factor for CVD mediated by the effects of thyroid hormones on lipid metabolism and blood pressure.<sup>6</sup>

## Criteria to definition of metabolic syndrome (Mets)

The metabolic syndrome criteria according to the 2001 National Cholesterol Education Program/ATP III<sup>4</sup>: Current ATP III criteria define the metabolic syndrome as the presence of any three of the following five traits:

1. Abdominal obesity, defined as a waist circumference in men  $>102$  cm (40 in) and in women  $>88$  cm (35 in).
2. Serum triglycerides  $\geq 150$  mg/dL (1.7 mmol/L) or drug treatment for elevated triglycerides.
3. Serum HDL cholesterol  $<40$  mg/dL (1 mmol/L) in men and  $<50$  mg/dL (1.3 mmol/L) in women or drug treatment for low HDL-C.
4. Blood pressure  $\geq 130/85$  mmHg or drug treatment for elevated blood pressure.
5. Fasting plasma glucose (FPG)  $\geq 100$  mg/dL (5.6 mmol/L) or drug treatment for elevated blood glucose.

This study was carried out to find out the relationship in changes of lipids levels in hypothyroid patients with and without metabolic syndrome and to see the correlation of different components of lipid profile with TSH levels.

## MATERIAL AND METHODS

The study was performed in Clinical Biochemistry Department, Sri Aurobindo Institute of Medical Sciences, Indore. A total of 81(cases 51, control 30) hypothyroid patients with age and gender matched were recruited as control group by using convenience sampling technique. After obtaining the informed consent each patient was subjected to detailed history and clinical examination which include anthropometric measurements, lipid profile and thyroid profile. On this basis only those patients were selected who were having hypothyroidism with or without metabolic syndrome. Subjects were taking lipid lowering drugs, pregnant women and infants were excluded as cases from the study. Healthy age and gender matched controls with no acute or chronic illness, on anti-inflammatory drugs, pregnant women or women using

## INTRODUCTION

Hypothyroidism is a very common endocrine problem; it causes symptoms that reduce the functional status and quality of life. Hypothyroidism is defined as a deficiency of thyroid activity. It results from reduced secretion of either total thyroxine (T4) or triiodothyronine (T3). It leads to hyper-secretion of pituitary thyroid-stimulating hormone (TSH) and so greater increase in serum TSH levels.<sup>1</sup> Hypothyroidism can be either overt or subclinical. Subclinical hypothyroidism predisposes to overt hypothyroidism. Hypothyroidism leads to hypercholesterolaemia because of reduced activity of lipoprotein lipase and thus increases the cardiovascular risk.<sup>2</sup> Thyroid hormones appear to serve as a general pacemaker accelerating metabolic process and may be associated with metabolic syndrome.<sup>3</sup> Metabolic syndrome (MetS), a cluster of disorders including central obesity, glucose intolerance, hypertension and dyslipidemia, has been used to identify individuals at risk of cardiovascular disease (CVD)<sup>4,5</sup> Thyroid functions affect metabolic syndrome parameters including HDL cholesterol, triglycerides, blood pressure and plasma

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oral contraceptive pills were excluded as controls. Serum Total T3, Total T4 and TSH were analyzed on fully automated immunoassay system (Cobas e411, Roche, Hitachi) based on principle of chemiluminescence immunoassay. Lipid profile included measurement of total cholesterol (TC), high density lipoprotein cholesterol (HDL-C) and triglycerides (TG) were analyzed by Vitros-5.1, FS auto analyzer by using ready-made dry chemistry kits from Ortho-Clinical diagnostics, Johnson & Johnson, USA. Low density lipoprotein cholesterol (LDL-C) and very low density lipoprotein cholesterol (VLDL-C) calculated by using the Friedwald formula. The data was analyzed by using XLSATE version 2014 software package. Mean, Standard deviation and correlation coefficient (r) were applied. A *P* value < 0.05 was considered as statistically significant.

## RESULTS

The present work is a hospital based cohort study in which 51 hypothyroid subjects, with or without metabolic syndrome, were recruited. Of the 51 hypothyroid patients with mean age of  $38.92 \pm 11.27$  years, 31 were females and 20 were males in the study group. Patients were distributed in to different groups. The percentage of hypothyroidism and metabolic syndrome in each group were determined.

Out of total 51 subjects 22 were overt hypothyroid and 29 in subclinical hypothyroid group. Among these groups MetS is distributed, 58.8 % in overt hypothyroidism and 41.3% in subclinical hypothyroidism. Whereas more number of females (n=11 and n=9) in overt and subclinical hypothyroid groups than male (n=7 and n=3). Our study revealed that the prevalence of metabolic syndrome was more among the females with thyroid dysfunction. This conclusion was withdrawn from: 75% of SCH and 61.1% of overt hypothyroid

patients were females and that metabolic syndrome is significantly higher in SCH and overt hypothyroidism patient group. A higher prevalence in women might be related to their higher rate of obesity. In the present study we found the extremely significantly (*P* < 0.0001) increased of all anthropometric parameters (blood pressure, BMI and WC) except age (*p*=0.1738 NS) in total (n=51) hypothyroidism patients than control (n=30) subjects. Lipid profile consisted of TC, TG, VLDL-C, LDL-C and ratios of TC/HDL-C and LDL-C/HDL-C showed statistical significantly raised (*P* < 0.0001) whereas HDL-C observed decreased (*P* < 0.0001) as same manner in total hypothyroid patients than control group. In case of thyroid profile T3 and T4 showed statistical significantly decreased as HDL-C (*P* < 0.0001) while TSH levels found significantly higher in hypothyroid patients than control group. (Table 1). In the present work we did not find any statistical significant (*P* > 0.05) difference in age between any group.

Table 2 showed the significance changes between overt and subclinical hypothyroidism patients.

Lipid profile and TSH levels showed the statistical significantly higher (*P* < 0.001) while T3, T4 and HDL-C showed significantly decreased (*P* < 0.001) in overt hypo when compared with SCH patient. No significant differences were found in anthropometric parameters (Age, WC, BMI and blood pressure) with *P* values 0.3487, 0.1186, 0.3618 and 0.3108 respectively between overt and subclinical hypothyroidism patients. Whereas all variables were found significantly (*P* < 0.001) elevated except age while T3, T4 and HDL-C were observed (*P* < 0.001) significantly lower in both the groups when they compared with control group.

In the present work, we did not find any significant changes on comparison between with and without metabolic syndrome groups of overt hypothyroidism patients. All variable

Parameters	Hypothyroidism (Mean±sd)	Control (Mean±sd)	<i>P</i> values
Age (Years)	38.92±11.27	36.70±8.08	0.1738
WC (CM)	93.88±7.75	80.16±4.04	<0.0001
BMI (Kg/M <sup>2</sup> )	26.33±1.48	23.00±1.12	<0.0001
BPS (MM/Hg)	126.17±7.97	118.16±4.37	<0.0001
DPS (MM/Hg)	87.78±6.06	80.16±4.04	<0.0001
TC (MG/DL)	190.08±57.46	116.42±13.74	<0.0001
TG (MG/DL)	174.55±52.53	102.57±10.14	<0.0001
HDL-C (MG/DL)	28.42±5.59	47.90±5.22	<0.0001
LDL-C (MG/DL)	126.69±56.79	48.01±14.97	<0.0001
VLDL-C (MG/DL)	34.91±10.50	20.51±2.02	<0.0001
TC:HDL-C	7.27±3.72	2.46±0.44	<0.0001
LDL-C:HDL-C	4.97±3.26	1.02±0.40	<0.0001
T3 ng/ML	0.93±0.42	1.67±0.27	<0.0001
T4 µg/ML	5.03±2.08	9.69±1.05	<0.0001
TSH µIU/ML	35.81±31.69	3.59±0.98	<0.0001

All values are expressed in mean & standard deviation (Mean±SD).

*P* values less than 0.05 indicates significant difference between the two groups or variables.

Abbreviation: BMI=body mass index; BPS=systolic blood pressure; DPS=diastolic blood pressure; WC= waist circumference; T3=t-riiodothyronine; T4=thyroxine; TSH=thyroid-stimulating hormone HDL-C=high density lipoprotein cholesterol; LDL-C=low density lipoprotein cholesterol; TC=total cholesterol; TG=triglyceride; TC: HDL= ratio of total and high density lipoprotein cholesterol; LDL:HDL= ratio of low density lipoprotein and high density lipoprotein cholesterol.

**Table-1:** Comparison of all variables between Control and Hypothyroidism Subjects

reported statistical not ( $P > 0.05$ ) significant. Only Age, diastolic blood pressure, WC, BMI, HDL-C and TSH levels considered not but quit significant with  $P$  values 0.0962, 0.0698, 0.0524, 0.0744, 0.0692 and 0.0512 respectively. But when they compared with control subjects some of variables showed significant variation. Overt hypothyroidism with metabolic syndrome group presented the extremely significantly ( $P < 0.0001$ ) raised values of all variables except T3, T4 and HDL-C which were showed significantly decreased on comparison with control group whereas without metabolic syndrome group showed the extremely ( $P < 0.0001$ ) significantly increased of BMI, lipid profile, TSH and systolic blood pressure showed statistical significant ( $P = 0.0325$ ) while T3, T4 and HDL-C observed significantly decreased and diastolic blood pressure considered not quit significant with  $P = 0.0560$  on comparison with control group. (Table 3). The significant changes were found in some variable on comparison between with and without metabolic syndrome groups of subclinical hypothyroidism patients. Thyroid profile (T3, T4 and TSH) and diastolic blood pressure re-

ported not ( $P > 0.05$ ) significant. BMI and lipid profile except HDL-C showed the significantly ( $p < 0.001$ ) higher and HDL-C declined ( $P < 0.001$ ) significantly in SCH with MetS than without MetS of SCH group. Whereas TG and VLDL observed not statistical ( $P > 0.05$ ) significant with  $P$  values 0.4711 while Age and systolic blood pressure considered not quit significant with  $P$  values 0.0793 and 0.0870 respectively. (Table 3).

But when they compared with control group we noticed the extremely significantly changes in all variables except age. Subclinical hypothyroidism with and without metabolic syndrome group showed the extremely significant ( $P < 0.0001$ ) difference with all variables except age ( $P = 0.3531, 0.1553$ ) on comparison with control group. (Table 3).

We also compared between with and without metabolic syndrome groups of both overt and subclinical hypothyroidism. The measured anthropometric (age, blood pressure, WC and BMI) parameters found not significant ( $P > 0.05$ ) while HDL considered not quit significant with  $P$  values 0.0887 and rest of the variables (TC, TG, LDL, VLDL, TC:HDL, LDL:H-

Parameters	Overt hypothyroidism (Mean±sd)	Subclinical hypothyroidism (Mean±sd)	$P$ values
Age (Years)	39.63±9.96	38.37±12.30	0.3487
WC (CM)	95.36±9.43	92.73±6.13	0.1186
BMI (Kg/M <sup>2</sup> )	26.42±1.76	26.27±1.25	0.3618
BPS (MM/Hg)	126.81±7.95	125.68±8.09	0.3108
DPS (MM/Hg)	87.95±6.66	87.65±5.68	0.4317
TC (MG/DL)	224.41±67.69	164.03±28.83	<0.0001
TG (MG/DL)	204.60±60.75	151.57±30.20	<0.0001
HDL-C (MG/DL)	25.81±5.22	30.48±5.06	0.0012
LDL-C (MG/DL)	157.67±67.89	103.20±31.26	0.0002
VLDL-C (MG/DL)	40.92±12.15	30.35±6.04	<0.0001
TC:HDL-C	9.43±4.47	5.64±1.81	<0.0001
LDL-C:HDL-C	6.76±3.98	3.62±1.64	0.0002
T3 ng/ML	0.60±0.34	1.18±0.28	<0.0001
T4 µg/ML	2.96±1.11	6.61±0.93	<0.0001
TSH µIU/ML	60.11±33.10	17.37±12.47	<0.0001

**Table-2:** Comparison of all Variables between all three Study Groups

Parameters	Overt Hypothyroidism (Mean±sd)		Subclinical hypothyroidism (Mean±sd)	
	With MetS	Without MetS	With MetS	Without MetS
Age (Years)	39.31±9.46	32.75±1.70	42.25±13.71	35.64±10.81
WC (CM)	96.20±9.40	87.63±6.39	94.61±7.27	91.44±5.00
BMI (Kg/M <sup>2</sup> )	26.63±1.78	25.15±1.61	26.82±1.32	25.88±1.08
BPS (MM/Hg)	128.43±8.70	122.50±2.08	128.33±9.12	123.82±6.96
DPS (MM/Hg)	89.37±6.80	83.75±6.39	88.50±6.65	87.05±5.01
TC (MG/DL)	234.19±63.34	186.50±96.07	182.75±21.63	150.82±26.17
TG (MG/DL)	211.58±668.42	175.25±21.68	152.25±29.16	151.40±31.79
HDL-C (MG/DL)	25.37±4.48	29.75±7.22	27.50±3.26	32.58±5.11
LDL-C (MG/DL)	166.50±62.71	121.70±99.02	124.80±21.34	87.95±28.30
VLDL-C (MG/DL)	42.31±13.68	35.05±4.33	30.45±5.83	30.28±6.36
TC:HDL-C	9.88±4.57	7.07±4.77	6.77±1.39	4.83±1.66
LDL-C:HDL-C	7.14±4.03	4.79±4.40	4.65±1.25	2.88±1.51
T3 ng/ML	0.57±0.35	0.68±0.39	1.10±0.25	1.24±0.29
T4 µg/ML	2.81±10.5	3.14±1.55	6.75±0.95	6.51±0.93
TSH µIU/ML	68.13±32.44	36.71±33.67	20.59±16.68	15.10±8.22

**Table-3:** Comparison of all Variables between all Study Groups

DL, T3, T4 and TSH) showed highly significant ( $P < 0.001$ ) between overt and subclinical with metabolic syndrome patients group. Only the thyroid profile (T3, T4 and TSH) showed the significant ( $P < 0.001$ ) difference while TC, TG, VLDL, and ratio of TC:HDL and LDL:HDL considered not but quit significant with  $P$  values 0.0854, 0.0873, 0.0873, 0.099 and 0.0705 respectively and rest of the variables (age, blood pressure, WC and BMI) reported not ( $P > 0.05$ ) significant on comparison without metabolic syndrome of overt and subclinical patients groups. (Table 3).

In the present work we measured the correlation coefficient ( $r$ ) between TSH and other investigated variables in total hypothyroidism patients. We observed the direct relationship between TSH and most of the variables. TC, LDL-C, VLDL-C TG including ratios of TC/HDL-C and LDL-C/HDL-C showed the positive relationship with TSH levels. (Table 4). Out of the anthropometric parameters only the BMI showed positive whereas age and BP did not show any significant relation to the TSH while WC considered not quit significant. We also observed an inverse relationship between TSH and thyroid hormone (T3 and T4) and HDL-C levels in total hypothyroidism patients.

## DISCUSSION

Hypothyroidism is associated with many biochemical abnormalities. Levels of total cholesterol and low density lipoprotein cholesterol tend to increase as thyroid function declines.<sup>7</sup> Thus hypothyroidism constitutes a significant cause of secondary dyslipidemia. Jung<sup>8</sup> found mean plasma total cholesterol and LDL cholesterol levels elevated in hypothyroidism cases than normal controls. In another study, average serum total cholesterol level was found elevated in primary and secondary hypothyroidism.<sup>9</sup> Keyes and Heimberg<sup>10</sup>, Laker and Mayes<sup>11</sup> found triglyceride level elevated in hypothyroid patients. So, our study findings were consistent with the previous studies done by other investigators.

In hypothyroid patients, despite the reduced activity of HMG CoA reductase, there is often an increase in the serum total cholesterol concentration, mainly due to raised levels of serum LDL cholesterol and intermediate density lipoprotein (IDL) cholesterol.<sup>12</sup> Decreased thyroid secretion greatly increases the plasma concentration of cholesterol because of decreased rate of cholesterol secretion in the bile and consequent diminished loss in the feces due to decreased number of low density lipoprotein receptors on liver cells.<sup>13</sup> Decreased activity of LDL receptors resulting in decreased receptor-mediated catabolism of LDL and IDL is the main cause of the hypercholesterolemia observed in hypothyroidism.<sup>14</sup>

Increase in HDL cholesterol concentration is mainly due to increased concentration of HDL2 particles. Dullaart<sup>15</sup> have stated that decreased activity of CETP (cholesteryl ester transport protein) results in reduced transfer of cholesteryl esters from HDL to VLDL, thus increasing HDL cholesterol levels. Lam<sup>16</sup> have stated that in hypothyroid patients decreased activity of hepatic lipase leads to the decreased catabolism of HDL2 particles leading to increased HDL. So,

S. No.	Parameters	Correlation coefficient (r)	P values
	AGE (Years)	0.001	0.9905
	WC (CM)	0.2573	0.0684
	BMI (Kg/M <sup>2</sup> )	0.3044	0.0299
	BPS (MM/Hg)	0.0497	0.7288
	DPS (MM/Hg)	0.0726	0.6124
	TC (MG/DL)	0.6221	<0.0001
	TG (MG/DL)	0.6774	<0.0001
	HDL-C (MG/DL)	-0.4318	0.0016
	LDL-C (MG/DL)	0.5466	<0.0001
	VLDL-C (MG/DL)	0.6774	<0.0001
	TC:HDL-C	0.5591	<0.0001
	LDL-C:HDL-C	0.5173	<0.0001
	T3 ng/ML	-0.8302	<0.0001
	T4 µg/ML	-0.7069	<0.0001

$r$ =correlation coefficient between the variables; P values less than 0.05 indicates significant difference between the two groups or variables.

**Table-4:** Correlation between TSH and all Variables in Total Hypothyroidism Patients

decrease in HDL cholesterol level in our study might be due to increased activity of CETP and lipoprotein lipase in hypothyroid patients.

Our study also revealed the prevalence of metabolic syndrome was more among the females with thyroid dysfunction. A higher prevalence in women might be related to their higher rate of obesity. This finding was consistent with the study done by Shantha et al.,<sup>17</sup> who found that females with metabolic syndrome had significant association with SCH. The study by Uzunlulu et al.,<sup>18</sup> and Nehal Hamdy et al.<sup>19</sup> had also shown females to be more associated with SCH and metabolic syndrome.

Our study was similar to other authors who were reported as patients with overt hypothyroidism exhibit significantly higher TC, LDL-C and TG compared to normal controls.<sup>20</sup> The increase in lipid levels can be reversed by thyroid hormone supplementation.<sup>21</sup> In subjects with subclinical hypothyroidism, significant increase in the levels of TC, LDL-C, TC/HDL ratio compared to euthyroid subjects has been also observed.<sup>22</sup> The significant and independent relationship between TSH and TG, as shown in the current study was further supported by the observations of Wang et al.,<sup>23</sup> in which TSH and TG was significantly associated in a Chinese euthyroid population. They also found that TSH was not associated with HDL-C and LDL-C which were not similar to the present study. We reported significantly higher values in lipid and BMI in with metabolic syndrome than without metabolic syndrome cases of subclinical hypothyroidism patients. Whereas Lai Y et. al., have been suggested an associations between subclinical thyroid disease and MetS in their previous studies. A recent study in Taiwan explored the relationship between serum TSH levels and components of MetS, concluding that even slight increases in TSH, as in subclinical hypothyroidism, may be a MetS risk factor; in that study, TSH levels were significantly higher in the MetS group than in the non-MetS group.<sup>24</sup>

In our study showed the positive relationship of high TSH with BMI in total hypothyroidism patients while according to Roos *et al* study<sup>26</sup> showed positive relationship of low T3 and T4 with WC in both men and women. Some studies showed adipocytes and pre-adipocytes expressed TSH receptors, TSH bounded with TSH receptors and induced pre-adipocytes to produce and release adipokines, some of them such as leptin played a very important role in the onset of metabolic syndrome and cardiovascular disease.<sup>25</sup> Abnormal thyroid function can increase peripheral vascular resistance and activate the sympatho-adrenal system, leading to increase in BP but our findings are in disagreement with some researchers like Salkiti *et al*<sup>26</sup>, Waterhouse *et al*<sup>27</sup> and Nagasaki *et al*<sup>28</sup> who found that TSH positively correlated with systolic BP and or diastolic BP. Park *et al*<sup>29</sup> found that higher levels of TSH predict the prevalence and risk of metabolic syndrome in overt hypothyroidism and subclinical hypothyroidism. We also agreed with their study. Our study has confirmed the presence of a positive relationship between serum TSH and cholesterol levels. This is supported by Xu *et al.*,<sup>30</sup> studies who reported an inverse relationship between thyroxin and cholesterol while the positive with TSH.

## CONCLUSION

TSH may be one of many biochemical modulators of circulatory lipids. High TSH was associated with deleterious changes in serum lipids which may increase the cardiovascular mortality and morbidity in patients of subclinical and overt hypothyroidism with metabolic syndrome or without metabolic syndrome. This study on metabolic syndrome in thyroid dysfunction population may help us to plan management strategies, resulting in significant reduction in cardiovascular morbidity and mortality due to metabolic syndrome.

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# Prevalence and Risk Factors of Obstructive Sleep Apnea in Hypertensive Patients

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## ABSTRACT

**Introduction:** Hypertensive patients have a higher incidence of obstructive sleep apnea (OSA). The prevalence and risk factors of OSA among the hypertensives with OSA symptoms, of this geographical region was not yet been studied. Therefore, the prevalence and risk factors of OSA among the hypertensive patients with OSA symptoms was described in this study.

**Materials and Methods:** All adult hypertensives patients (blood pressure > 140/90) with OSA symptoms were subjected to overnight polysomnography. Patients with secondary hypertension were excluded. Factors such as age, gender, BMI, other co morbidities like diabetes, asthma, cardiovascular diseases etc. were collected. The risk factors associated with OSA were subjected to a multivariate logistic regression analysis and calculated the odds ratios with 95% confidence intervals.

**Results:** Sixty five patients were included in the study, 40 were obese and 25 were non-obese. The prevalence of OSA among the hypertensives with OSA symptoms was 80%. Among the obese patients, 36 (90%) had OSA. Among the non-obese patients, only 16 (64%) had OSA. The comorbidities most commonly seen in hypertensive OSA patients were dyslipidaemia, diabetes mellitus and coronary artery disease. Obesity was found to be the independent risk factor (P value = 0.041, Odds ratio 4.313) than any other co morbidities for the incidence of OSA.

**Conclusions:** There is a high proportion of OSA patients among the hypertensives with OSA symptoms. Obesity is one of the independent risk factor for OSA. Single centre and small sample size were the limitations of this study. A generalized multicentre study is warranted for the appropriate preventive strategies.

**Key words:** Apnea; Hypopnea; Hypertension; Obesity; Polysomnography

predispose to weight gain and obesity. Indeed, patients with newly diagnosed OSA have a history of excessive recent weight gain in the period preceding the diagnosis.<sup>3,4</sup> In addition, chronic *Continuous Positive Airway Pressure*(CPAP) therapy has been shown to decrease body fat and visceral fat accumulation in patients with OSA which further strengthen the evidence for an etiologic link between OSA and body mass.<sup>5</sup> The reported prevalence of systemic hypertension (HT) in those with OSA ranges from 15 to 56%.<sup>6</sup> There is experimental evidence to support a causal link as blood pressure (BP) has been shown to rise acutely with each apnea during the night.<sup>7</sup> Also associated with apneas are repetitive arousals, hypoxia, and rises in catecholamines and sympathetic nervous system activity, all of which can lead to daytime HT.

The coexistence of OSA and obesity may have more widespread implications for cardiovascular control and dysfunction in obese individuals and may contribute to some of the clustering of abnormalities broadly defined as the metabolic syndrome. The presence of resistant hypertension and the absence of a nocturnal decrease in BP in obese individuals should prompt the clinician to consider the diagnosis of OSA, especially if clinical symptoms suggestive of OSA are also present. Although much research has been undertaken in the area of association between OSA, systemic hypertension and obesity, till date there are no studies which compare between obese and non-obese hypertensives to estimate the proportion of OSA patients among them. Many patients with vague symptoms are misdiagnosed as OSA without any objective evidence from polysomnography (PSG). The prevalence and risk factors of OSA among the hypertensives with OSA symptoms, of this geographical region was not yet been studied. Hence, this study was aimed to estimate the prevalence of OSA among hypertensives patients as well as to assess the risk factors for OSA in such patients in order to select the most appropriate preventive strategies.

## INTRODUCTION

Sleep is a universal phenomenon exhibited by all organisms. Sleep disordered breathing is said to be present when there are recurrent episodes of cessation of respiration (apneas), decrements in airflow (hypopneas) or Respiratory Event Related Arousals (RERAS). Obstructive sleep apnea (OSA) is one of the most common sleep disorders. Population studies using sleep recordings show that OSA affects about 25% of adult males and 10% of adult females.<sup>1</sup> Male sex and obesity were strongly associated with the presence of sleep-disordered breathing. Significant sleep apnea is present in 40% of obese individuals and 70% of OSA patients are obese.<sup>2</sup> While obesity increases the risk for OSA, sleep apnea may

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## MATERIALS AND METHODS

### Patients' selection

In this cross sectional study, patients who attended the out-patient department of Institute of Chest Diseases, Government Medical College, Kozhikode from August 2007 to July 2009 with a diagnosis of essential hypertension (BP > 140/90 mm of Hg in supine position from an average of at least two measurements or the use of antihypertensives) with symptoms of OSA were included.<sup>8</sup> Symptoms of OSA included snoring, excessive daytime sleepiness, nocturnal choking episodes, recurrent awakenings from sleep, unrefreshing sleep, daytime headache and impaired concentration.

Patients who did not give consent, who could not sleep during the procedure, patients with secondary hypertension, or cases in which any technical errors occurred during the procedure were excluded from the study

### Study procedure

A consent form was signed by each study subject and approval for the study was obtained from the Institutional Scientific and Ethics Committees. Hypertensive subjects with symptoms suggestive of OSA were sought through a detailed interview involving the patient and also the partner. Detailed history regarding the type of occupation and various comorbidities were taken. A thorough history, followed by a complete physical examination including anthropometry (body mass index calculated from height in m and weight in kg) was done. All patients were subjected to routine blood investigations, chest X-ray, ECG, fasting lipid profile and thyroid function tests.

Each patient underwent an attended overnight polysomnography (PSG) in the sleep laboratory. PSG included the following recordings: electroencephalogram, chin electromyography, electro-oculography, chest and abdominal movements and body position measured by inductance plethysmography, airflow and snores detected via a nasal pressure sensors, oxygen saturation (SpO<sub>2</sub>) by a pulse oximeter, and heart rate monitored by ECG electrodes. Results were analyzed by software and are also scored manually. Apneas were defined as complete cessation of airflow for >10 seconds. Hypopneas were defined as reduction of >50% in one of three respiratory signals - airflow signal or either respiratory or abdominal signals of respiratory inductance plethysmography, with an associated fall of at least 4% in oxygen saturation with or without an arousal.

OSA is diagnosed if a patient has a cumulative apnea hypopnea index (AHI) of  $\geq 5$ . Those with OSA are further grouped based on AHI into three classes of severity as mild OSA (AHI: 5 to 14.9), moderate OSA (AHI: 15 to 29.9), and severe OSA (AHI  $\geq 30$ ), as per American Sleep Disorders Association (ASDA) criteria.<sup>9</sup>

The subjects were also stratified based on age, gender, occupational status, severity of OSA and comorbidities. The comorbidities analyzed were diabetes mellitus (DM), dyslipidaemia (DLP), coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), asthma and hypo-

thyroidism. Those comorbid conditions (including obesity) which are independent risk factors for OSA were identified with the help of statistical analysis.

## STATISTICAL ANALYSIS

Analysis was done using SPSS software version 16. Pearson Chi Square test was done. P value and Odds Ratio were calculated. p value <0.05 was considered as significant. Multivariate logistic regression was also done to nullify the effects of confounding variables.

## RESULTS

A total of 68 patients were initially enrolled in the study out of which 3 patients were excluded based on exclusion criteria. 80% of symptomatic hypertensives in this study have objective evidence of OSA. Majority of the subjects included in the study were obese (P < 0.05) (Figure 1). There were 40 (62%) subjects obese and 25 (38%) subjects were non-obese. The proportion of patients with objective evidence of OSA was estimated in both the groups with the help of overnight PSG. Thirty six subjects (90%) in the obese group and 16 (64%) subjects in the non-obese group had objective evidence of OSA. Thus the proportion of OSA patients in the obese group was distinctly high (p = 0.041 with odds ratio of 4.313) (Figure 2). Taking into account both the groups as a whole 80% of the subjects had objective evidence of OSA. In both the groups, the subjects were stratified depending on the severity of OSA. In the obese group 22% had mild OSA, 25% had moderate OSA and 53% had severe OSA. In the non-obese group this was 25%, 37.5% and 37.5% respectively (Figure 3).

Patients were also stratified based on age. In the obese group majority of the patients were in the 50 - 59 year age group (42%). This was followed by the 40 - 49 year age group (25%) and 60 - 69 year age group (19%). In the non-obese group majority of the patients were in the 50 - 59 year age group (75%). This was followed by the 60 - 69 year age group (19%) (Table 1).

Both in the obese group as well as in the non-obese group majority of the patients were males. Males constituted 69% of the OSA patients in the obese group and 94% of the OSA

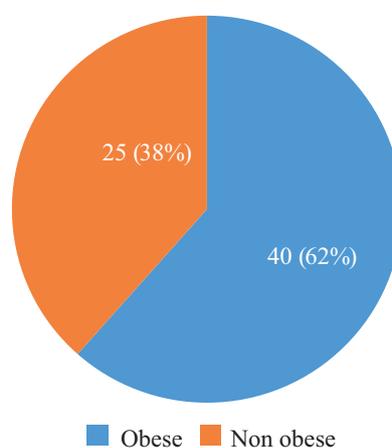
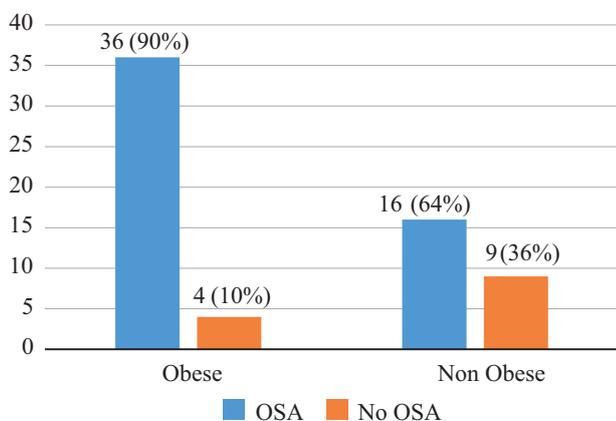


Figure-1: Distribution of subjects with obese and non-obese group

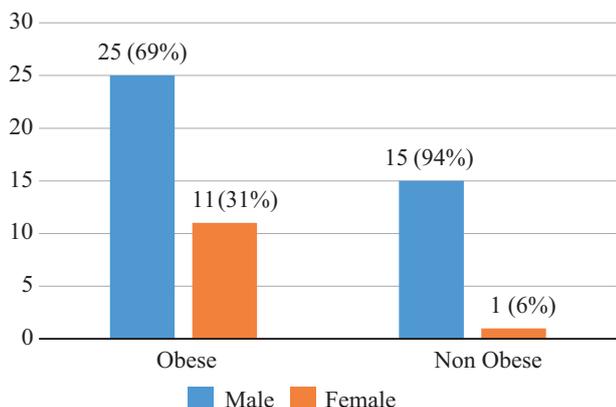
patients in the non – obese group (Figure 4). In both the obese as well as non – obese group majority of the subjects were leading a sedentary type of life. Most of them were businessmen, drivers or office staff etc. 97% of the subjects in the obese group and 94% of the subjects in the non – obese group were leading a sedentary life.

The various comorbid conditions in both the obese and non-obese groups were analyzed. The most common comorbidities seen were DLP, DM and CAD. The other comorbid conditions seen were hypothyroidism, COPD and asthma. In the obese group 63% had DLP, 51% had DM and 38% had CAD. In the non-obese group 44% had DLP, 31% had DM and 19% had CAD (Figure 5). None of them was found to be independent risk factor for the incidence of OSA as evident from the multivariate regression analysis.

Statistical analysis reveals a significant association between



**Figure-2:** Proportion of patients with objective evidence of OSA among the obese and non obese groups.

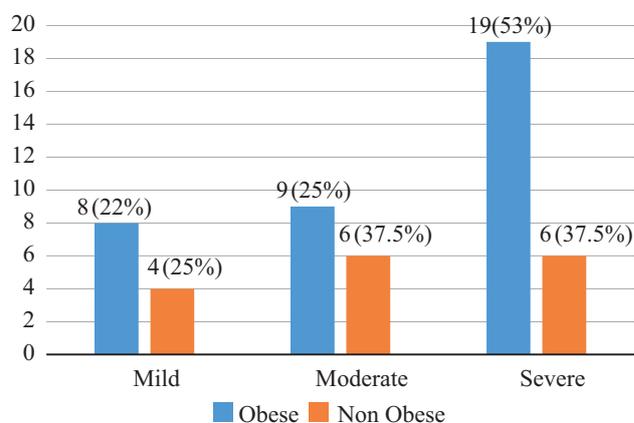


**Figure-4:** Distribution of patients on gender basis

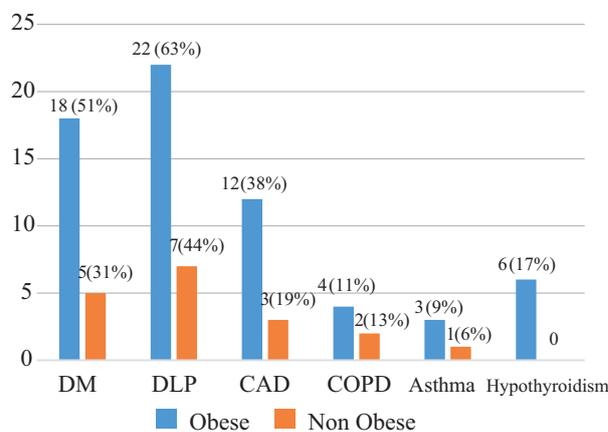
OSA and obesity, DM and CAD as revealed by significant P values and Odds Ratios. In the case of DM and CAD the P value loses significance after multivariate logistic regression. But the Odds Ratio is still high in the case of DM. In the case of CAD the loss of significance can be attributed to the fact the number of subjects included in the study is very less (Table 2).

### DISCUSSION

Results of this study revealed that the prevalence of OSA among the study population with HT, having OSA symptoms was 80%. The Sleep Heart Health Study of >6000 patients, showed a linear relationship between systolic and diastolic blood pressures and severity of OSA.<sup>10</sup> The recurrent ap-



**Figure-3:** Distribution of subjects depending on the severity of OSA.



**Figure-5:** Various comorbid conditions in both the obese and non-obese groups

Age group (yrs)	Obese			Non obese		
	OSA	No OSA	Total	OSA	No OSA	Total
20-29	1 (100%)	-	1 (100%)	-	-	-
30-39	3 (75%)	1 (25%)	4 (100%)	1 (25%)	3 (75%)	4 (100%)
40-49	9 (81.8%)	2 (18.2%)	11 (100%)	-	2 (100%)	2 (100%)
50-59	15 (93.8%)	1 (6.3%)	16 (100%)	12 (85.7%)	2 (14.3%)	14 (100%)
60-69	7 (100%)	-	7 (100%)	3 (60%)	2 (40%)	5 (100%)
70-79	1 (100%)	-	1 (100%)	-	-	-
Total	36 (90%)	4 (10%)	40 (100%)	16 (64%)	9 (36%)	25 (100%)

**Table-1:** Age wise distribution of patients with OSA

Comorbidity	P Value (univariate)	P value (multivariate)	Odds Ratio
Obesity	0.011	0.041	4.313
DM	0.056	0.115	3.943
DLP	0.534	-	1.471
CAD	0.027	0.822	0.932
Hypothyroidism	0.706	-	0.717
COPD	0.706	-	0.717
Asthma	1	-	1
Any comorbidity	0.278	-	2.123

**Table-2:** Summary of statistical analysis

noic episodes due to OSA and consequent transient rise in nocturnal BP has been implicated in the development of sustained systemic hypertension.<sup>11</sup> The seventh report of the Joint Committee on Prevention, Detection, Evaluation and Treatment of High BP lists sleep apnea as an important cause of secondary hypertension.<sup>12</sup>

Four important facts need consideration regarding OSA and hypertension. First, clinicians should seek for OSA symptoms and consider a PSG in patients with resistant hypertension.<sup>13</sup> Second, treatment of OSA in hypertensive (HTs) OSA patients may improve control of blood pressure but without large reductions, while snoring and quality of life should improve. Third, CPAP is not a replacement for pharmacological treatment. Fourth, obesity is a unifying factor and, so, weight loss measures should be the primary objective for clinicians.<sup>14</sup>

Lavie et al.<sup>15</sup> screened 50 patients with HT and found that 26% had an apnea index greater than 5 per hour. Kales and coworkers<sup>16</sup> used PSG to diagnose OSA in patients receiving treatment from a HT clinic and found that 30% had an apnea index greater than 30, 64% had an apnea index greater than 3, compared with zero in a control group of normotensive (NT) subjects. Fletcher and coworkers<sup>17</sup> compared 46 male HTs taken off medication with 34 male NTs and found that 30% of the HTs and 9% of the NTs had an apnea index greater than 10 determined with PSG. The two groups were matched for age and weight.

The result of our study is more towards the higher range among the published figures. This can be attributed to the fact that our study has been done in a group of HT patients who are suffering from the symptoms of sleep disordered breathing. Minai et al<sup>18</sup> found no significant differences were observed between the pulmonary hypertension (PH) and no PH groups regarding age or apnea-hypopnea index, although generally mild to moderate, severe PH can occur in patients with OSA. The investigators found that the subjects with mild, moderate and severe OSA were 47%, 34% and 19% respectively. These results are slightly different from the results of our study. In our study majority of the subjects fall in the 'severe OSA' group. This may be because of the fact that our study is done on a group of OSA symptomatics with systemic hypertension, and not pulmonary hypertension. Moreover, our study has stratified the subjects based on OSA severity in the obese and non – obese groups separately.

John et al<sup>19</sup> studied the prevalence of OSA in untreated and

treated hypertensive patients in Australia by comparing them with normotensive subjects, taking into account the possible confounding variables body mass index, age, sex, and alcohol consumption. 38% of the 34 untreated and 38% of the 34 treated hypertensives, and 4% of the 25 normotensives had apnea hypopnea index greater than 5. In this study, the mean age of the untreated hypertensives was 58 years and that of the treated hypertensives was 60.9 years. This finding almost closely matches with our study also.

Our study classifies hypertensive OSA patients based on their gender too. Both in the obese group as well as in the non-obese group majority of the patients were males. Males constituted 69% of the OSA patients in the obese group (M: F ratio of 69:31 ) and 94% of the OSA patients in the non - obese group ( M:F ratio of 47:3 ). Study by John et al<sup>19</sup> also found majority of the patients were males. The male:female ratio in the treated and untreated hypertensives were 26:8 and 33:1 respectively. This is also in accordance with the results of our study.

Studies demonstrate that as little as 10 % weight reduction is associated with a more than 50% reduction in the severity of OSA.<sup>20</sup> A prospective epidemiological study reported that a 10% weight gain led to a six-fold increase in the odds of developing moderate to severe OSA.<sup>21</sup> In our study, the majority of the subjects were obese (obese : non – obese = 62:38). In the previously mentioned study by John et al<sup>19</sup> also, majority of the patients were obese. The study of John et al<sup>19</sup> demonstrated that the mean BMI of the treated and untreated hypertensives were 28.9 and 28.7. This is very close to the cut – off value of 30 kg / m<sup>2</sup> selected in our study. Our study also found a statistically significant relationship between OSA and obesity.

Treatment of OSA in diabetic patients may be a potential therapeutic option to improve macro, but not microvascular outcomes.<sup>22</sup> Insulin resistance and visceral obesity are the core risk factors that define the metabolic syndrome.<sup>23</sup> OSA exhibits pathophysiologic mechanisms that may potentially contribute to the development of insulin resistance.<sup>23</sup> Recent studies have more consistently demonstrated an independent association between OSA and insulin resistance in adults.<sup>24</sup> Diabetes has been associated with complaints related to sleep.<sup>25</sup> There is substantial evidence that glucose tolerance is impaired in patients with OSA.<sup>26</sup> However, there are other studies<sup>27</sup> that have not supported an independent association with sleep-disordered breathing but attribute the glucose intolerance to the presence of obesity. The 'metabolic syndrome' is a term used to describe the grouping of several risk factors for cardiovascular disease: obesity, hypertension, insulin resistance, and dyslipidemia. These metabolic abnormalities are often observed in patients with OSA, and some<sup>28</sup> have proposed that OSA is probably another manifestation of the metabolic syndrome. However, since obesity and OSA are so closely associated, it is difficult to distinguish the metabolic effects of obesity and OSA. Visceral fat is known to be metabolically active, producing a variety of inflammatory and metabolic substances that have been implicated in the pathogenesis of insulin resistance and atherosclerosis.<sup>29</sup>

The symptoms of hypothyroidism overlap with those of OSA and are difficult to distinguish with certainty. Obesity is a common factor. Pelttari et al<sup>30</sup> found that 50% of hypothyroid patients had some degree of sleep-disordered breathing compared with 29% of a euthyroid control group. Whether thyroid function tests should be ordered in all patients with suspected OSA is controversial. It seems reasonable, however, to perform thyroid function testing in patients who have other reasons to consider hypothyroidism, such as in postmenopausal women or patients with dyslipidemia. In hypothyroid patients with OSA, thyroid replacement has been shown to improve sleep disordered breathing in some studies.<sup>31,32</sup>

It is a well recognized fact that systemic HT as well as obesity predispose to the development of OSA. But our study highlights the added influence of obesity over hypertension in the pathogenesis of sleep disordered breathing. No similar study has been undertaken so far. Moreover majority of the research work on OSA has been from the developed nations where the prevalence of obesity is much more. Very limited study has been done in India and especially from Kerala. It is in this context that our study assumes importance.

Our study is conducted in subjects who are suffering from the symptoms of OSA. Though this may be attributed as a limitation of the study it has significance too. In our part of the world the facility and accessibility to a sleep study centre is very much restricted. Many of the practicing physicians are tempted to make a vague diagnosis of obstructive sleep apnea whenever they meet an obese patient with the symptom of snoring. But from our experience with the work we realized that all those who snore are not suffering from OSA. All those patients with OSA symptoms should be subjected to an attended PSG in sleep lab before labeling them as OSA. Awareness has to be created among doctors as well as patients in this regard. Single centre and small sample size were the limitations of this study. A generalized multicentre study is warranted for the appropriate preventive strategies.

## CONCLUSIONS

Among the hypertensives with symptoms suggestive of OSA, 80% are having abnormal Apnea Hypopnea Index. Obesity is an independent risk factor for OSA (P value = 0.041, Odds Ratio = 4.313). Comorbid illnesses are commoner in obese hypertensives when compared to non-obese hypertensives. The most significant association was found with diabetes mellitus and coronary artery disease. Single centre and small sample size were the limitations of this study. A generalized multicentre study is warranted for the appropriate preventive strategies.

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# Natural Smile Preservation - Reattachment of Fractured Maxillary Incisor - A Case Report

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## ABSTRACT

**Introduction:** Coronal fractures of the anterior teeth are a common form of dental trauma that mainly affects children and adolescents. One of the options for managing coronal tooth fractures is the reattachment of the dental fragment. Reattachment of fractured tooth fragments can provide good and long-lasting esthetics (because the tooth's original anatomic form, color, and surface texture are maintained).

**Case report:** A 42 year old male patient reported to the department of Conservative Dentistry and Endodontics, visnagar, having fractured anterior teeth and pain as chief complaint. Patient had a history of fall 7 day before. There was complicated crown fracture of right maxillary central incisor with no soft tissue injury or swelling.

**Conclusion:** Preservation of the tissue is the main moto of any treatment. This technique restores function and esthetics with a very conservative approach, and it should be considered when treating patients with coronal fractures of the anterior teeth.

**Keywords:** Reattachment, Fractured Tooth, Esthetics, Trauma, Maxillary Central Incisor.

## CASE REPORT

A 42 year old male patient reported to the department of Conservative Dentistry and Endodontics, having fractured anterior teeth and pain as chief complaint. Patient had a history of fall 7 day before. Medical history was non-contributory. There was complicated crown fracture with right maxillary central incisor. There was no soft tissue injury or swelling. tooth was tender. On examination, the coronal fragment was attached buccally by fragile soft tissue. Clinical and radiographic examination revealed oblique fracture of maxillary right central incisor involving enamel, dentin and pulp. Fracture line was oblique running labial to palatal in an apical direction with associated pulp exposure (Ellis class 3 fracture). As the patient was mainly concerned about esthetics, immediate reattachment of fragments was planned. Fractured tooth fragment was removed first (Figure 2). The fractured fragment of crown was checked for fit with the remaining tooth structure. Root integrity was assessed with preoperative periapical radiographs. The treatment plan was decided as first to perform root canal treatment, second post space preparation, third post cementation and reattachment of the fragment. The fractured fragments were kept in 5% sodium hypochlorite for 1 minute to dissolve the remaining pulp tissue, and then placed in normal saline during the entire period before reattachment.

Single sitting endodontic treatment was performed. Post space was prepared in both the radicular portions of the tooth and the fractured crown fragment using pesso drill no 3. Appropriate-size post was cemented using rely-X™ U200 self-adhesive resin cement. (3M ESPE, Germany), (figure 3). The fractured fragments were etched with 37% phosphoric acid for 15 seconds and thoroughly rinsed with air water spray. Excess water was removed with a brief jet of air, so that the surface was left visibly wet. The bonding agent was applied to the wet dentin and enamel of the fragment. The fractured tooth was treated in similar fashion. The fragment was repositioned correctly on the fractured tooth (Figure 3 and 4). The fragment site was light polymerized on the fa-

## INTRODUCTION

Webster defines esthetics as a theory "Beauty dealing with art, its creative sources, its forms and its effects." Esthetic failure is mainly because of the inaccurate, deficient communication with patient.

Trauma to the anterior teeth is common in the child and adolescent.<sup>1</sup> Most of the time falls, traffic accidents, violence, and sports results in the common injuries to permanent teeth. The fractured tooth can have negative functional, esthetic, and psychological effects.<sup>2</sup> In the aesthetic era, reattachment of fractured fragment should be considered first for treating the fractures of the anterior teeth. This method requires the fragment should be stored and preserved.<sup>3</sup>

Chosack and Eidelman reported the first case of reattachment of fractured incisor in 1964 in which the complicated tooth fracture was managed by endodontic therapy followed by a cast post and core. Tannery, Starkey and Simonsen reported the cases of the reattachment of fractured fragment by using the acid etch technique.<sup>1</sup> The success of reattachment depends upon many factors like site of the fracture, type, severity, direction of fracture line, periodontal health and pulpal status, material used for reattachment and type of post.<sup>4</sup>

This article reports a case of Ellis class 3 fractures in the maxillary central incisor, which was treated by reattachment of the fractured fragments using a fiber post luted by resin based cement.

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Figure-1(a,b,c): Pre-operative radiograph and pre-operative clinical photograph



Figure-2 (a,b,c): Fractured tooth fragment after removal.



Figure-3(a,b): post placement, reattachment of tooth fragment.

cial and palatal surface for 40 seconds each. Finishing and polishing of the restoration were carried out. Contact was relieved in all the protrusive, lateral movements and teeth were allowed to have protected occlusion. Post-operative instructions were given.

## DISCUSSION

Trauma to the anterior teeth is aesthetically unpleasant which also affects the patient’s psychological status and self-confi-

dence. Therefore, immediate treatment for the trauma to anterior teeth is required to preserve the original esthetics.

In year 1978, Tennery reported a case the acid-etch technique with a composite resin to bond tooth fragments to the remnant tooth. In 1979, Starkey reported reattachment of a tooth Fragment. In 1982, Simonsen again reported reattachment of fractured units; he used external and internal enamel bevel to improve esthetics. In 1983, McDonald and Avery described reattachment of tooth units, with no enamel preparation. They used acid etch technique to reattach the fragment.<sup>1</sup>

In recent times of adhesive dentistry, use of the adhesive system to treat the trauma cases is considered the most conservative option. New dentine bonding systems work with such effectiveness that they allow for normal masticatory forces.<sup>3</sup> There are many factors that are taken to consideration before deciding the treatment plan for trauma cases. These factors include the site of fracture, size of fractured remnants, periodontal status, pulpal involvement, maturity of root formation, biological width invasion, occlusion, time and resources of the patient.<sup>5</sup>

Depending on these factors various treatment options are – Reattachment of fractured Fragment, Composite restoration, Orthodontic extrusion, Surgical extrusion. Crown lengthening. Followed by Post and Core supported restorations. In the pre adhesive era, fractured teeth needed to be restored either with pin retained inlays or cast restorations which sacrificed healthy tooth structure and were challenging.<sup>3,6</sup> In this case, to reinforce the pulp less teeth glass fibre post was used. It has monobloc effect with no inherent weak interlayer interface helps in distribution of stresses to the remaining radicular dentin. It has less chance of microleakage and good bond strength to tooth. The apical region of the post space is far from the light; this area inhibits degree of conversion of resin cement. So In this case, self-adhesive dual cured universal resin cement (Rely X U200) was used



**Figure-4(a,b):** Post-operative photograph after post cementation; (c) post-operative radiograph.

to cement the post. Its use facilitated the light penetration and increased the composite resin conversion. It was white and transparent.<sup>7</sup>

Several advantages of fiber post for reattachment of fractured fragment are<sup>8</sup> -Conservation of tooth structure, Simple procedure, Less chair time, Esthetics, Bonding to the tooth structure.

Reis and Colleagues have shown that a simple reattachment with no preparation of the fragment or tooth had less fracture resistance whereas Buccal Chamfer had more fracture resistance.<sup>9</sup> Reattachment techniques are important because they are directed towards the fracture strength of the restored tooth. There are several reattachment reinforcement techniques adapted to strengthen the tooth structure like<sup>8</sup> - External chamfer Circumferential bevel, Placement of internal grooves, V' shaped bevel, Superficial over contour of restorative material over the fracture line and pulp chamber, in case of complicated fracture.<sup>5</sup>

## CONCLUSION

Restoration of the fractured tooth fragment with the most conservative treatment is utmost important because of the esthetic concerns. Reattaching the fractured tooth fragment to the tooth remnant enhances the durability of the restoration, as the fragment wears at the same rate as that of the other teeth. Also, the natural enamel translucency and surface finish of the fragment delivers the tooth with its original esthetics. The combined use of prefabricated post and the original tooth fragment is the simple, conservative approach which gives the excellent result in esthetic rehabilitation of the tooth.

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# Spectrum of Biopsy Proven Nephropathies in A Tertiary Care Hospital in Mysuru

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## ABSTRACT

**Introduction:** Renal diseases are common cause of increased morbidity and mortality. So making a definitive diagnosis in the initial stages of renal disease by renal biopsy helps in better management and better prognosis in these patients. This study has analysed the indication for renal biopsy, pathological patterns of kidney biopsies and clinic-pathological correlation for patients admitted in our hospital with a indication for renal biopsy and compared data with other centers.

**Material and method:** This is a retrospective analysis of kidney biopsies over a period of 1 year 3 month, from September 2014 to December 2015. A total of 60 kidney biopsies were included in the analysis

**Results:** The most common indication of kidney biopsy was nephritic syndrome.

The most common histopathology was membranoproliferative glomerulonephritis. The most common complications of the procedure were pain at biopsy site in 5(8%), gross hematuria in 3(5%), perirenal hematoma in 1(1.6%) and no patients had life threatening hematuria requiring nephrectomy.

**Conclusion:** There is a changing trend in major histological groups in the primary glomerular diseases and in our study it is observed that MPGN is common. However, almost across the world, the most common secondary glomerular disease has been documented as LN. Renal biopsy findings has helped in better management of these patients.

**Keywords:** Nephrotic syndrome (NS), acute nephritic syndrome(ANS), acute renal failure (ARF), rapidly progressive renal failure (RPRF), PGN (primary glomerular nephropathy), Mcd (minimal change disease), Fsgs (focal proliferative glomerular disease), Mn (membranous nephropathy), Mpgn (membranoproliferative glomerulonephritis), Pign (post infectious glomerulonephritis), Dpgn (diffuse proliferative glomerulonephritis), IgAN (IgA nephropathy), C3gn (C3 glomerulonephritis), CGN (chronic glomerulonephritis), SGN (secondary glomerular nephropathy), DMN (diabetic nephropathy), Ln (lupus nephritis), MM (multiple myeloma), TMA (thrombotic microangiopathy), AIN (acute interstitial nephritis), CIN (chronic interstitial nephritis), ATN (acute tubular necrosis), CPN (chronic pyelonephritis), HTN (hypertension) AUA (asymptomatic urinary abnormalities). TIN (tubulointerstitial nephropathy), VN(Vascular nephropathy).

## INTRODUCTION

Renal biopsy helps in making specific diagnosis, assessing the level of disease activity, treatment and prognosis of disease. The indications for the renal biopsy are nephrotic syndrome (NS), acute nephritic syndrome (ANS), non re-

covering acute renal failure (ARF), rapidly progressive renal failure (RPRF), unexplained chronic renal failure (CRF), systemic diseases with renal dysfunction, non-nephrotic proteinuria, isolated microscopic hematuria, renal transplant dysfunction, and familial renal diseases.<sup>1</sup>

There is a changing trend in the occurrence of various renal disease including glomerular disease.<sup>1</sup> Glomerular diseases remain the most common cause of end-stage renal disease all over the world. Evaluation leads to better management and leads to decrease incidence of the ESRD in these patients. Study also evaluates the variation in these diseases in different geographic areas, variation according to race, age. Renal Biopsy analysis forms a foundation for further research in renal diseases. Proteinuria, hematuria, hypertension, impaired renal function, oliguria, anuria. polyuria, uraemia<sup>2</sup> are the main clinical presentation of these diseases.

## MATERIALS AND METHODS

We studied 60 subjects admitted with renal disease to K.R. Hospital and who underwent kidney biopsies with a definite indications in our institute from September 2014 December 2015. And their clinical data, biopsy report were retrospectively analyzed.

### Inclusion Criteria

All patients with an indication to do renal biopsy admitted in K.R. Hospital wards and who underwent renal biopsy.

### Exclusion Criteria

Biopsies of transplant kidney, tumor, inconclusive results. Details for each patient.

Data collected included name, age, sex, clinical findings, indication for renal biopsy, histopathological diagnosis and laboratory investigations such as serum creatinine, 24-hour urinary protein, urine microscopy, virology (HBsAg, anti-HCV, HIV) and serology [anti-dsDNA antibody, antinuclear antibody (ANA), C3, C4 were recorded. Renal biopsy specimens were analysed by pathologist. Analysis included

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light microscopy (LM) and immunofluorescence (IF). Electron microscopy (EM) was done whenever it was indicated. Indications for renal biopsy were: Nephrotic Syndrome, acute nephritic syndrome (ANS), asymptomatic urinary abnormalities (AUA), hematuria, Non recovering Acute Renal Failure, Chronic Renal Failure (if biopsy was feasible), and Rapidly Progressive Renal Failure. Automated biopsy guns were used to do biopsy. Data were analyzed and compared with studies published from India and different regions of the world.

## STATISTICAL ANALYSIS

Simple descriptive statistics such as median and mean  $\pm$  SD were used for variables such as age, clinical and laboratory features. Percentage was used for categorical data.

## RESULTS

A total of 60 renal biopsies were analyzed retrospectively from September 2014 to December 2015. Among them 56% were males and 44% were females. The mean age of patients was (40.4 $\pm$ 6.35) years. The number of patients who underwent renal biopsies had been increasing monthly.

The most common indication for renal biopsy was nephritic syndrome(41%), followed by nephrotic syndrome (30%) as seen in table 1.

From the data collected and analyzed, it can be seen that primary glomerular disease remained the most common important kidney disease in our patients and accounted for 61% of the total patients including SGN, TIN and VN. Among the PGN cases, MPGN (20%) was the leading category, followed by IgAN (11.6%), PIGN (11.6%), MCD (8.3%) followed by MN (6.6%), chronic glomerular nephritis CGN (5%), DPGN (3.3%), FSGS (3.3%), C3gn (3.3%) The most common SGN was LN (5%), followed by Mm (3.3%). ATN was seen 11.6% patients and most of it associated with other renal disease except only in 1 case(3.3%) only ATN was seen. VN was less common diagnostic categories. There were no hereditary glomerular diseases in this analysis.

In our study most frequent causes of nephritic syndrome was Mpgn and most frequent causes of nephrotic syndrome was Minimal change disease and our study mainly included adults. Membranous glomerulopathy was second common cause of nephrotic syndrome. By the age of the patient, most of the Primary glomerular nephropathy was diagnosed between second and fourth decades and among secondary glomerular disease all lupus nephritis were seen in female patients in the age group between 20 to 40 years. Multiple myeloma was seen after fourth decade. In unresolving ARF two patients had ATN, one had chronic kidney disease and one post partum ARF biopsy done after 8 weeks with history of post partum hemorrhage (atonic) had acute cortical necrosis. Crescentic glomerulonephritis was common in anti glomerular basement disease (100%) that is all cases had crescents, followed by mpgn (30%), IgA nephropathy (11%) and pign one case out of 7 case had crescents. With the definitive diagnosis the management has significantly changed.

In mpgn 33% have complete remission with recovered renal function with treatment. 16% gone for partial remission, 33% ckd, one person is dialysis dependant. All cases of IgAN, have recovered and on regular follow up. Among 3 LN case one complete remission, one died due to sepsis and on initial diagnosis on renal biopsy was having chronic renal disease and she is under follow up. DMN has progressed to ckd, all Pign cases recovered including one who had crescents but one patient is still dialysis dependant even after 3 weeks treatment. C3Gn one partial remission other complete remission. Multiple myeloma one referred to oncologist and other died. All Mn cases has recovered. All MCD recovered. Among 3 antiGBM disease one lost to follow up and two recovered with immunosuppression and plasmapheresis. TMA case had CKD changes and died. Acute cortical necrosis case stable with dialysis support. Among Fsgs patients, they are under follow up and proteinuria under regression. All ATN and AIN complete remission. Among CKD only one dialysis dependant others are non dialysis dependant.

Indication of renal biopsy	Numbers (%)
Nephrotic syndrome	18(30%)
Proteinuria non-nephrotic	7(11%)
Nephritic syndrome	25(41%)
Acute renal failure(nonresolving or unexplained)	2(3%)
Chronic kidney disease	6(10%)
RPRF	2(3%)
Systemic disease	2 (4%)
Isolated hematuria / asymptomatic urinary abnormalities	0(0%)

**Table-1:** Indication for renal biopsy.

Major categories	Renal diseases	Numbers (%)
PGN	Mcd	5(8.3%)
	Fsgs	2(3.3%)
	Mn	4(6.6%)
	Mpgn	12(20%)
	Pign	7(11.6%)
	Dpgn	2(3.3%)
	IgAN	7(11.6%)
	C3gn	2(3.3%)
SGN	CGN	3(5%)
	DMN	1(1.6%)
	LN	3(5%)
	MM	2(3.3%)
	TMA	1(1.6%)
TIN	Anti glomerular basement membrane disease	3(5%)
	AIN	4(6.6%)
	CIN	2(3.3%)
	ATN	7(11.6%)
	CPN	1(1.6%)
VN	HTN changes	1(1.6%)
	Acute cortical necrosis	1(1.6%)

**Table-2:** Histopathological categories of renal biopsy

	Our study	Dakishinamurthy et al India	Pakistan	Korea	Italy	Spain	Iran
a)PGN	84	69.1	73	74	59.9	-	-
MCD	11.36	15.1	5.8	15.5	7.8	7.8	9.8
MN	11.36	7	17.2	12.3	20.7	9.7	23.8
MPGN	27.27	3.9	1.1	4	-	4.3	-
IgAN	15.9	4.4	1.5	28.3	34.5	15.2	13.5
FSGS	4.5	10.5	21.2	5.6	11.8	10	10.3
b)SGN	16	18.2	10.9	11.8	25.4	-	-
DMN	2.2	1.2	0.9	2	-	-	-
LN	6.8	14.6	4.9	8.7	51.6	8.8	10.6

**Table-3:** Comparison of some common glomerular disease in our study to other studies (in percentages)

## DISCUSSION

Our study gives information about the common indications of renal biopsy, clinical syndromes and pattern of kidney diseases diagnosed by renal biopsy during our study period in a single tertiary care referral institute in south India. Since there is bias regarding demographical, geographical, racial characteristics, differences in indications for renal biopsy, the analyzed clinical syndromes and variations in pathological classification, we have compared our data with different data already done. A comparison of the basic data and some common diseases in our series with those of other published studies from other parts of India and other countries is done and given in Table 3. It is obvious from the table that the distribution pattern of major histology of renal disease in our study reveals that primary glomerular nephropathy common than secondary glomerular nephropathy similarly seen in other studies.<sup>1-4</sup> Different histology pattern were seen in various studies within India and outside India.<sup>1-4</sup>

Our data show that Nephritic syndrome was the most frequent clinical presentation, accounting for 41 % of all cases. This is in contrast to other reported studies around the world, including India and Pakistan where nephrotic syndrome was common.<sup>5,6,11,13,16,25</sup> We also observed a male predominance in the overall cases except in SGN. Among SGN there is increased prevalence of LN in the female population. All recently published studies worldwide showed a similar pattern<sup>7-19,25</sup> Conversely, studies from Japan and Italy reported a higher frequency of AUA, which is quite different from ours.<sup>9,12</sup> The underlying etiology of Nephritic syndrome is variable across the world. In our study, the most common was MPGN followed by IgAN, Pign, AntiGBM disease, FSGS and rare in MN. This is in contrast to other studies where MPGN is rare.<sup>1</sup> The underlying etiology of NS is variable across the world. In our study, the most common cause was MCD, followed by, MN, MPGN, IgA N and FSGS. In other study in India the most common cause was MCD, FSGS followed by, MN, MPGN.<sup>1</sup> MCD was most common cause of NS in other studies done in Japan and Korea.<sup>9</sup> MN was most frequent diagnosis in in Serbia<sup>13,18</sup>, FSGS was the most common cause of NS in Brazil.<sup>13,18</sup>

MCD is more common in some Asian than the western countries and various studies have shown a decline in the relative frequency of MCD<sup>6,8,14</sup> similar to our study. In our analysis, however, it is one of the common PGD, which is in con-

cordance with other similar studies. The incidence of FSGS was also variable in other studies and in our study it was of lesser incidence. Our study showed MN to be one of the common PGD in adults similar to other studies.<sup>5,7,9,11,15,16,22,25</sup> Our results also support this incidence. IgAN was common in the present series and in other studies from this region of the world.<sup>3-6</sup> It is the most common primary renal disease in European countries and some Asian countries.<sup>7-9,11</sup> We have also observed that there is an increase in the incidence of PIGN and we also observed a higher percentage of CresGN. In addition to this, the number of biopsies in CRF patients is increasing when the kidneys are of normal size with intact corticomedullary distinction by ultrasonogram. Most of these patients turned out to be CIN and MPGN. Among all renal pathologies PGN is the most predominant renal disease as analysed in our study and other recent studies, followed by SGN and TIN.<sup>7,8,-13,15,22,25</sup> The vascular diseases are less frequent

The most common SGN in our study was LN which is comparable with that reported in many studies across the world.<sup>4-8,11,18</sup> Anti GBM disease was also common and incidence is increasing when studies are analysed. The incidence of other categories of SGN was very less.

TIN is found to be a relatively less frequent. We observed a higher incidence of ATN (11%) which can be explained by aggressive performance of biopsy procedure in patients with ARF with prolonged recovery without an obvious etiology. The study has less number of patients with obstetric complications. We did not find hereditary conditions like Alport Syndrome and thin basement membrane nephropathy, which reflects the lack of EM in our center.

## CONCLUSION

To conclude, our study has analyzed that there is a wide variation in renal disease especially among primary glomerular diseases as reported by renal biopsy report. MPGN was the commonest category of renal disease. LN was the most common secondary glomerular disease. Renal biopsy gives confirmatory diagnosis of these renal disease which further helped in better management and thus decreasing the incidence of these renal diseases going into CKD and ESRD.

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# Functional Outcome of Displaced Acetabular Fractures Treated by Open Reduction and Internal Fixation

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## ABSTRACT

**Introduction:** Management of displaced acetabular fractures need accurate knowledge of anatomy, approach and the potential complications. Often patients treated for acetabular fractures tend to do not that good due to multiple reasons.

**Materials and methods:** In this research article, we retrospectively assessed all the acetabular fracture patients treated with Open Reduction and internal fixation to look into the functional status and the reasons for poor functional outcome. The patients with all the relevant data were included in the study. Letournel and Judet classification was used to classify the fractures. Comparison was done with pre operative and post operative radiographs along with current one to assess the reduction obtained and the current status. Modified Merle D'Aubigne Score and Harris Hip Score was used for clinical assessment.

**Results:** Among the 20 patients we included in the study, 75 - 82.5% of patients had excellent scores, 5% poor scores.

**Conclusion:** We found statistically significant clinico- radiological mismatch in the functional status of these patients.

**Keywords:** Acetabulum, function, scoring, ORIF.

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## MATERIALS AND METHODS

Study was done in the Department of Orthopaedics, Amrita Institute of Medical Sciences and Research Centre, Kochi. A cohort of 54 patients were identified meeting the inclusion criteriae. Of these, 20 patients were included in the study and follow up studies. The relevant clinical and radiological findings, mechanism of injury, fracture pattern and classification were noted at the time of admission. Fractures were classified based on Letournel and Judet Classification. Patients were grouped according to sex, age, fracture pattern and the associated complications. Operative indications included unstable or incongruence of the hip, posterior wall or anterior wall fractures with column displacement.

**Inclusion Criteriae:** Those patients with acetabular fractures and surgically treated by Open Reduction and Internal Fixation in our Institute between 2002 to 2012 who have given valid informed consent to take part in the study.

**Exclusion Criteriae:** Patients with open fracture, ipsilateral shaft of femur fracture, those lost to follow up and patients managed non operatively were excluded.

At the time of arrival, after initial management and stabilisation, all the patients were evaluated with three radiological views – AP Pelvis and 45° oblique views of Judet and CT scan. Those patients with instability of the hip, displacement of a fragment by > 2 mm, dislocation with a posterior wall fracture, and articular impaction or depression as seen on the pre-operative CT scan were considered candidates for surgery. All patients were operated using single approach (Kocher- Langenbeck, ilioinguinal, or extended ilioinguinal). Open Reduction and Internal Fixation was attempted to achieve anatomical reduction of the articular surface of the acetabulum. Suction drain was used routinely and was removed after 48 hours. Post operatively skin traction was applied and no prophylaxis for heterotopic ossification was used in any patient. DVT prophylaxis was started in obese

## INTRODUCTION

Acetabular fractures are more common these days due to the high speed modern life style. The significance lies in the fact that these injuries are associated with other life threatening situations. Proper management includes prompt stabilization, control of the life threatening situations, proper timing and timely internal fixation with accurate reduction. Acetabular fractures are classified by the "Letournel" and "Judet" system.<sup>1</sup> There exists only few established acetabular surgeons due to difficult exposure, frequent complications, difficulty in obtaining anatomical reduction and joint congruency and ultimately poor functional outcome. The outcome depends on personal characteristics of the patient and circumstances of the accident<sup>2</sup>, type of fracture, displacement and comminution as well as concomitant diseases have been said to affect clinical outcome.<sup>3</sup> Varied factors are considered to influence the functional outcome of these patients; which include the fracture pattern, surgeon's expertise, patient's age, associated chondral damage and neurovascular injury and patient's co-morbidities and functional expectations. We assessed the functional status of our patients who underwent ORIF acetabulum in our Institution from 2012 onwards.

Aims and objectives of the study were to evaluate and determine the functional outcome of patients with displaced acetabular fractures surgically treated by Open Reduction and Internal Fixation at Department of Orthopaedics, Am-

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patients with limited mobilization post operative. Immediate post operatively, ankle mobilization was started.

We retrieved the post operative radiographic images (AP Pelvis) of these patients and was evaluated for reduction and comparison with the latest radiographs. In all patients, immediate post operative complications were noted. Mobilisation was done as early as possible with the aid of physiotherapist. Toe touch weight bearing was allowed till around 6 weeks, partial weight bearing for next 6 weeks and full weight bearing from 3 months onwards. Clinical and radiological assessment and functional scoring was undertaken at six and 12 weeks, four, six and 12 months post-operatively and annually thereafter using (Modified Merle D'Aubigne Score and Harris Hip Score). Heterotopic ossification, Avascular Necrosis and Osteoarthritis were diagnosed based on clinical and X ray findings.

## RESULTS

Of the 54 patients we obtained who underwent Acetabulum ORIF during the study period, one patient had bilateral acetabuli fracture, one sustained open fracture injuring the rectum, 24 were lost to follow up and 8 patients died due to age related poor health. Overall, we had total sample size of 20. 78% of them were males. Age of the patients ranged from 14 years to 70 years. Mean age was 42.6. The follow up period ranged from 13 years to 3 years and the mean follow up period was 7.53 years. Right hip was involved in 15 cases and left hip in 5 cases. The most common mechanism of injury is bike accident. (45%). Clinically the subjects were graded according to Modified Merle D'Aubigne Scoring and Harris hip Scoring as Excellent, Good, Fair, and Poor. The most common fracture noticed among our study group is posterior wall fracture (30%).

40% of patients in our study group developed osteoarthritis and 15% each had avascular necrosis and heterotopic ossification. Most of these patients had a follow up period more than 6 years. The incidence may rise with further follow up. No specific fracture pattern was found to be associated with osteoarthritis and avascular necrosis. At the time of presentation, 25% patients had dislocated their hip and of them 15% had sciatic nerve palsy. 60% of these patients developed AVN on follow up of atleast 4 years. 2 patients developed post-operative infection in which extensile approach was used for fixation. The incidence of infection in our study is comparable to similar studies.<sup>4,5</sup> Three patients (15%) underwent THR 2,5 and 7 years after the acetabular surgery. The conversion rate to THR also is comparable with similiar studies.<sup>6,7</sup>

85% and 75% of patients made it into the Excellent – Good group according to the MMDA score and Harris Hip Score respectively. Fair - Poor function was obtained in 1 patient (MMDA) and 2 patients (HHS).

## DISCUSSION

Fractures of acetabulum and pelvis are relatively rare; about 2% of all fractures.<sup>8,9</sup> The associated injuries which can hap-



**Figure-1:** X ray showing a posterior wall + posterior column fracture – AP view and the corresponding CT image showing displaced intra articular fragment.



**Figure-2:** Immediate post op X ray image – AP view and Obturator oblique view

Clinical grade	MMDA Score	Harris Hip Score
Poor	1	2
Fair	2	3
Good	14	13
Excellent	3	2

**Table-1:** Showing the clinical grades obtained with the two scoring systems.

pen alongwith causes significant morbidity and mortality<sup>10</sup> making it a dreaded one. Several studies demonstrates that accurate reduction and rigid internal fixation can decrease the incidence of post-traumatic arthritis and improve functional outcome.<sup>11-13</sup> Clinical outcome after acetabular fracture surgery is difficult to predict and earlier it used to be poor. Poor bone stock in older patients, comminuted articular surface fractures and poly-trauma patients with multiple co-morbidities are adverse factors influencing outcome.<sup>14</sup> Current trends in the treatment of these fractures include open reduction and internal fixation<sup>15</sup> according to the principles that apply to all intra-articular injuries.

Displaced fractures of the acetabulum are a diverse group of serious injuries which are difficult to treat and the functional results were poor in the earlier days. The success of the surgery and prognosis after high-energy trauma is, based on the articular cartilage viability and anatomical reduction. The goal of the open reduction and internal fixation of acetabular fractures is to return the patient to pre-fracture level of activities. However, despite the appearance of an anatomical reduction on radiographs, there may still be imperfections on areas of the articular surface that are invisible on standard plain radiographs or are hidden by plates and screws, which can be picked up with CT. In some of our patients with anatomical reduction, functional scoring does not correlate.

It must therefore be concluded that clinical results depend mostly on the severity of articular cartilage injury happened at the time of insult and the capability of the acetabulum in an adult to tolerate changes in the distribution of pressure and perhaps to reshape itself over time. A post operative CT evaluation may be warranted in indicated cases to assess the reduction obtained so that post operative physiotherapy and the treatment may be modified to obtain a better functional result. Complications can occur from the injury per se or can be the result of surgical treatment. Early complications include thrombo embolism (30% to 50%), neurologic injury (16 % to 30%), infection (3% to 9%), malreduction, loss of reduction, intra-articular hardware and vascular injury. Late complications include avascular necrosis (2% to 25%) heterotrophic ossification (1% to 60%), post traumatic arthritis (12% to 57%).

Our study results with regard to the incidence of fracture types were comparable with that of Magu NK et al.<sup>1</sup> and Letournel et al.<sup>2</sup> Among the Fair- Poor function group, one patient had post-operative infection requiring surgical debridement 3 times after the surgery. In the same group, two patients had perfect anatomical reduction in the follow up radiograph. Clinico-radiological mismatch observed can be due to multiple reasons of which the most possible would be the severity of the cartilage, labral or other soft tissue injury happened at the time of insult or intra-operative. Despite perfect reduction, osteoarthritic changes are expected to develop in the long term for which most common procedures done are hip arthrodesis or total hip replacement.

## CONCLUSION

The uncomplicated radiographic appearance and relatively simple operative approach for fractures of the posterior acetabular wall may mask the risk of poor results. A post operative CT may be used to assess the same. Fractures in elderly patients and those with extensive comminution are more likely to have a poor clinical result. However, a high likelihood of a long-term good-to-excellent result can be expected following anatomic reduction and internal fixation of these fractures. An increase in the rate of anatomical reduction and decrease in the rate of operative complications should be the goal of surgeons who treat these fractures, even though setbacks do occur due to associated injuries and inappropriate rehabilitation.

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# Knowledge Practice and Attitude Regarding Tobacco use Among Interns of A Private Medical College: A Cross Sectional Study

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## ABSTRACT

**Introduction:** Tobacco surveillance among medical students offers an opportunity to assess the preparedness for tobacco control among future health care professionals in India. Objective of the study was to study the awareness and pattern of tobacco use among the Undergraduate Medical Students of a private medical college in Mangalore, Dakshina Kannada.

**Material and Methods:** A Cross-sectional study was conducted among 102 medical students using a predesigned and pretested, semi-structured self-administered anonymous questionnaire. Data was analyzed by using SPSS v 16.

**Results:** Among 102 participants, 19(18.6%) were smokers. Majority of them were aged between 19-21 years with age of initiation being less than 18 years. Cigarette smoking was most common form of abuse among these students.

**Conclusion:** In the study smoking was found to be more prevalent in males as compared to females. Smoking also showed a consistent rise with the increasing age group and was found to maximum in the older age group. Awareness about harmful effects of tobacco abuse was good and they feel that tobacco cessation modules should be incorporated in the medical curriculum.

**Keywords:** Tobacco, Medical Students, Cessation, Undergraduates

## INTRODUCTION

Tobacco use has been stated as the single largest preventable cause of mortality and premature death worldwide according to a report published by World Health Organization in 2011.<sup>1</sup> In developing countries like India, mortality attributed to tobacco use is on an increase and has been estimated to reach around 13% by the year 2020.<sup>2</sup> This grave scenario clearly emphasizes the need to implement tobacco cessation program in the society with full vigour. It is here that health care professionals need to step in and join the battle against tobacco. The WHO framework convention on tobacco control, further emphasize the role of primary healthcare physicians in tobacco cessation campaigns in the community.<sup>3-5</sup> Patients often seek advice, guidance on most health related issues from a primary healthcare physician, it becomes clear that the doctors are in a position to impart knowledge and help patients to quit tobacco. Medical students who are the future doctors of the society become a very relevant activists against tobacco. The medical interns are in a unique positions in a healthcare hierarchy wherein they get to see patients from all speciality and are exposed to all patients in general and therefore are in a better position to impart knowledge against tobacco. Hence this study was conducted with the objective to assess the knowledge, practice and

attitude towards tobacco use among graduates of a private medical college in Mangalore, Karnataka.

## MATERIAL AND METHOD

The study population comprised of medical graduates who were doing internship training program in a private medical college in Mangalore, Karnataka. This was a cross sectional study done using a predesigned, semi structured, self-reported, anonymous questionnaire. After obtaining approval of the Institutional Ethics Committee, our participants were briefed about the study and those willing were asked to give a written informed consent. The study questionnaire was distributed among 130 interns, but only 108 completed questionnaire could be subjected to analysis. The questionnaire comprised of questions pertaining to the use of tobacco, pattern of tobacco use and cessation practice.

## STATISTICAL ANALYSIS

Data was analysed using SPSS software version 16. Descriptive statistics were used to infer results.

## RESULTS

### Demographic data and smoking rates

The response rate in the present study was 83.07%. Out of 130 questionnaires distributed, 22 were discarded due to incompleteness. A total of 108 were collected out of which 41.6% were males and 58.3% were females. The overall prevalence rate of smoking was 9.25% (n=10). The smoking rates were higher among male (17.7%), n=8. Compared to the female counterparts, where it was recorded as 3.17%, n=2. (Table 1)

### Knowledge regarding tobacco use

Majority of the interns were well aware of tobacco use and their ill effects. 88% of them gave correct responses to the queries asked (mean n = 95.1). Most of them agreed to the fact that tobacco is hazardous to the general health (100%, n=108). Very few people were aware of the harmful effects

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of passive smoking among non-smokers (94.4%, n=102). People were aware about the maternal smoking hazards and paternal smoking effects (85.18%, n=92) and 79.6%, n=86 respectively. 76.8%, n=83 had knowledge about the third hand smoking and could comprehend the association of passive smoking with neonatal deaths (Table 2)

### Patterns of Tobacco use

Among our subjects with tobacco habits, 100% were smokers. The consecutive questionnaire thus assessed only about the pattern of smoking rather than the overall use of tobacco. A total of 16 interns (14.8%) admitted to smoking cigarettes some time in their life and this percentage was slightly higher than the current cross sectional prevalence rate (9.25%). Further questions No. 3-10 were designed to assess smoking patterns, out of 10 smokers, around 70% had early onset of smoking prior to their admission into the medical college. With 40% of them reporting to have increased smoking, 20% of them have decreased use of cigarettes, with the further 40% maintaining the same level of smoking.

When asked to quantify, 10% of them admitted to use more than 20 cigarettes per day whereas 30% smoked 5-20 cigarettes per day with majority (60%) reporting to have smoked less than 5 cigarettes per day. Only 40% of them tried to quit smoking some time in their life with half of them experiencing craving while trying to do so. In spite of this, 50% of smokers did not feel they were dependent or addicted to nicotine while a mere 20% were unsure about it. About 60% responded positively when asked if they have plans to quit in the future.

### Attitude towards smoking cessation practices:

As much as 67.5% of interns (n=23) opined that doctors should positively speak about tobacco use to their patients but only 56.48% (n=61) reported of asking history themselves. Around 64.8% (n=70) thought that it is doctor's duty to advise against tobacco use, only 41.6% (n=45) could actually do so with their patients. 62.9% (n=68) agreed that interventions by health professionals helped people quit smoking, majority did not convince their patients (93.5%). 88.8% (n=96) were not confident enough to counsel their patients enough on this topic. Majority of them showed positive responses towards corrective measures, only 85.18% (n=92) were supportive towards a tobacco free campus. 73.1% (n=79) felt the need for ban on advertising tobacco products. 62.9% (n=68) advocated for a sharp increase in the prices of tobacco to stop its usage. When asked to opine about doctors who smoked, 84.23% (n=91) reported of having a negative opinion about them. 13.82% (n=15) preferred to stay neutral. 78.7% (n=85) of interns agreed that the health professionals should set a good examples by not smoking and 87.9% (n=95) also opined that the doctors who smoke are less likely to advise about it.

## DISCUSSION

The overall prevalence of smoking among interns was 9.25% in our study with a significant male preponderance of M:F =

6:1. This rate was much low in comparison with the general population<sup>6,7</sup> and also in comparison with similar studies conducted on medicos.<sup>5,8-11</sup>

Our study findings showed interns in a positive light when it came to assessment of their knowledge regarding harmful effects of tobacco, where majority of them were well aware of common hazards of tobacco use and also had knowledge about second and third hand smoke. These findings were consistent with few studies are also found to be contradictory to findings of some other similarly conducted research.<sup>12-14</sup> In this study assessment of pattern of tobacco use in interns shed light on the early onset of smoking in many with admission into medical school having no much influence on their smoking patterns. Though not many were heavy smokers, many still did not feel the need to quit nor could they perceive their habit as addiction and these sounds disturbing at many levels. Other studies done elsewhere across the globe have shown both similar and varying results on several parameters assessed.<sup>15-23</sup>

The present study while assessing attitudes and opinions of interns showed that though majority of students felt strongly doctors should routinely ask about tobacco use and advice against it, only half of them were actually practicing it on their patients. Though a significant percentage of them agreed to have received enough education in their curriculum, they have inhibitions to practice it due to lack of formal training in counselling against its usage. Our subjects however felt strongly about corrective measures and were in favour of tobacco sales ban near school, college campuses, enclosed public places. They also felt that tobacco sales should be restricted to children and young adolescents, similar studies done in this field reflect a similar picture with minimal variations<sup>16-25</sup>

The results of the present study clearly points towards lacunae in the current medical curriculum and our training programs. Since this study focussed on interns, who happen to be the first nodal point of therapeutic contact for patients in various specialties; they can be mentored for such preventive programs in the future. It is imperative that the current internship training programs must compulsorily include special training programs and workshops specific to tobacco cessation. Such innovative addition into the medical curriculum will definitely empower the intern community to deliver tobacco cessation services to all patients confidently and efficiently.

## CONCLUSION

	Number (n)	Percentage (%)
Total no of questionnaires collected	108 out of 130	83.07%
Male interns	45	41.6%
Females	63	58.3%
People who smoked	10	9.25%
Male	8	17.7%
Female	2	3.17%

**Table-1:** Demographic data and prevalence of smoking

Our study has rightly focussed on the health of the health giver where though the prevalence rates of tobacco use was lower, in spite of adequate knowledge it did not translate into positive practices towards tobacco cessation. This can be mainly attributed to the lack of training during their under graduation, hence the onus is on the policy makers to revise the curriculum to fit in tobacco cessation training. This may help them deliver services adequately and efficiently to patients and also we can aim at tobacco free society.

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# Outcome of Head Injury Patients Based on Computed Tomography (CT) Scan Findings in a Tertiary Care Hospital:- A Cross-sectional Study

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## ABSTRACT

**Introduction:** The major cause of head injury is trauma due to Road Traffic Accidents (RTA). Evaluation of all patients by Computed Tomography (CT) scan improved the diagnosis and tracing the exact location of injury or its after-effect.

**Material and Methods:** The present study was conducted in emergency department of Rohilkhand Medical College and Hospital (RMCH), Bareilly, UP from January 2014 to December 2015 to evaluate the outcome of the patients admitted because of head injury on the basis of CT scan.

**Results:** Out of total 452 head injury patients admitted, maximum 39.8% were belonged to the age group of 21-40 years. Maximum 75.9% of the head injury patients were admitted because of cerebral edema, followed by skull fracture (63.3%) and Intra-Cerebral Haematoma (46%). Survival rate observed maximum in Epidural haematoma (80.9%), followed by Pneumocranium (73.7%) and skull fracture (71.7%). Minimum survival rate was observed in Intra-ventricular Haemorrhage (21.7%).

**Conclusion:** CT scan findings are found to be helpful in detection and precise location of the parenchymal damage of the brain and helpful to evaluate the outcome.

**Keywords:** Head injury; Road Traffic injuries; Computed Tomography; Survival.

## INTRODUCTION

Road Traffic Accidents (RTA) is the Major and leading cause of head injury in teenagers and young adults.<sup>1</sup> Head injury is observed to be the immediate cause of deaths in 25% of acute trauma victims. RTA contributes more than 50% of head injuries and its one of the leading cause of death due to brain injuries.<sup>2,3</sup> An increasing health problem globally and especially in South-East Asia is Road traffic injury.<sup>4</sup> Majority of severely injured patients survives with severe disability and few of them spend their rest of life in vegetative state. Computed Tomography (CT) scan found to be very helpful to diagnose patient suffering from head trauma due to its accuracy, reliability, safety and wide availability.<sup>5</sup> A variety of mechanisms like motor vehicle accidents, falls from heights, assaults and struck of pedestrians by motor vehicles results in closed head injuries. The traumatic brain injures commonly occurs in the presence of additional injuries of other major organ systems but it can also occur alone.<sup>6</sup>

The single largest cause of morbidity and mortality in patients who reach the hospital alive is complications from closed head injuries; it is also applicable to children. Although the mechanisms vary, head injuries are the major cause of mor-

bidity and mortality in childhood trauma victims, accounting for an annual mortality rate of 1 per 1000 in this age group.<sup>7</sup> Immediate start of therapeutic management of brain injury on the basis of correct diagnosis is found to be helpful in increasing the survival of head injury patients.

The present study was conducted to assess different type of brain injuries following the head trauma and assess the survival rate in different type of brain injuries.

## MATERIAL AND METHODS

The present cross-sectional study was conducted in emergency department of Rohilkhand Medical College and Hospital (RMCH), Bareilly, Uttar Pradesh, from January 2014 to December 2015, after taking approval from, the Institutional Ethical committee. 452 head injury patients who were brought to the emergency department, during a period of 2 year, were included in this study, to assess different type of brain injuries following the head trauma and assess the survival rate in different type of brain injuries.

### Inclusion criteria

1. Head trauma patients admitted at emergency department, who was conscious and cooperative.
2. Head trauma patients admitted at emergency department, who were unconscious and had cooperative attendants.

### Exclusion criteria

1. Patient or attendants non co-operative.
2. Brought dead patients.

**Interview schedule:** Data was collected on daily basis from emergency department, using a pre-tested semi-structured interview schedule. Data were collected everyday by the candidate either in the casualty or in the wards of RMCH. Where condition of victims was not suitable for the inter-

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view, the relatives or attendants were interviewed. Purpose of the study was explained to each respondent. Nature of brain injury and survival rate was assessed on the basis of reports of CT scan and final outcome of the patients.

## RESULTS

The present cross-sectional study was conducted in emergency department of Rohilkhand Medical College and Hospital (RMCH), from January 2014 to December 2015. A total of 452 head injury patient satisfying the inclusion and exclusion criteria were included the study.

As shown in Table-1, out of total 452 head patients, maximum 39.8% belonged to age group 21-40 years, followed by 29.9% from age group of less than 20 years. And only 2% of head injury patients were in age group 60 years and above. Out of total 452, patients of head injury 375 (83%) were males and 77 (17%) were females. Male: Female ratio observed was approximately 5:1.

As per the findings of CT scan, maximum 75.9% head injury patients had cerebral edema, skull fracture was observed in 67.3% patients followed by Intra-Cerebral Haematoma

Age in Years	Male (%)	Female (%)	Total No. of patients	Percentage
≤20	116(85.93)	19(14.07)	135	29.9
21-40	143 (79.44)	37 (20.56)	180	39.8
41-60	108(84.4)	20 (15.6)	128	28.3
> 60	8(88.9)	1 (11.1)	9	2.0
Total	375(83.0%)	77(17.0%)	452	100
Male: Female= 5:1				

**Table-1:** Age distribution of patients

CT Findings	No. of patients*	Percentage
Cerebral edema	343	75.9
Skull fracture	304	67.3
Intra- cerebral Hematoma	208	46.0
Epidural hematoma	136	30.1
Subarachnoid hematoma	102	22.6
Subdural Hematoma	62	13.7
Pneumocranium	38	8.4
Intra-ventricular Hemorrhage	23	5.1
*Multiple responses		

**Table-2:** Distribution of patients according to CT scan findings

CT Findings	No. of patients*	Survived (%)	Expired (%)
Cerebral edema	343	178 (51.9)	165 (48.1)
Skull fracture	304	218 (71.7)	86 (28.3)
Intra- cerebral Hematoma	208	102 (49.0)	106 (51.0)
Epidural hematoma	136	110 (80.9)	26 (19.1)
Subarachnoid hematoma	102	26 (25.6)	76 (74.4)
Subdural Hematoma	62	14(22.6)	48 (77.4)
Pneumocranium	38	28 (73.7)	10 (26.3)
Intra-ventricular Hemorrhage	23	5 (21.7)	18 (78.3)
*Multiple responses			

**Table-3:** Distribution of head patients according to CT scan findings and its outcome

(46%) and Epidural Haematoma in 30.1% and Intra-ventricular haemorrhage was observed in only 5.1 % cases of head injury( shown in Table 2).

As shown in Table 3, survival rate observed maximum in patients of Epidural haematoma (80.9%), out of total 136 patients having CT findings of Epidural haematoma only 26 (19.1%) expired. Survival rate was minimum in Intra-ventricular Haemorrhage (21.7%) followed by Subarachnoid haematoma (25.6 %).

## DISCUSSION

Radiological evaluation of head injuries had undergone dramatic changes since the advent of CT scan, which found to be very helpful in diagnosis and treatment of patients with head injury.

In present study, the maximum 39.8% of patients admitted with head injury belonged to the age group of 21-40 years and 29.9% were less than 20 years. Out of 452 cases of head injury 375 (83%) were males while 77 (17%) were females, with male: female ratio of approximately 5:1. Similar finding were observed by Gupta et al<sup>8</sup>, Bharti et al<sup>9</sup>, Yattoo GH et al<sup>10</sup>, Khan MK et al<sup>11</sup>, Adam M Net al<sup>12</sup>, and Malhotra et al.<sup>13</sup> The main reason for it may be that this age group maximally involved in driving, thus they are more susceptible for the head trauma.

In the present study, on the basis of CT scan report, Cerebral edema was found in 75.9% head injury patients, followed by Skull fracture (67.3%), Intra-cerebral haematoma (46%), Epidural haematoma (30.1%), Subarachnoid haematoma (22.6%), Subdural haematoma (13.7%), Pneumocranium (8.4%) and Intra-ventricular haemorrhage in only 5.1% of head injury patients. Similar observations were reported by Yattoo GH et al<sup>10</sup>, Stein SC et al.<sup>14</sup> While Gupta P K et al<sup>8</sup> observed Cerebral edema in 63.4% head injury patients, followed by Skull fracture (62%), Intra-cerebral haematoma (46.3%), Epidural haematoma (30.4%), Subarachnoid haematoma (28.8%), Subdural haematoma (19.4%), Pneumocranium (12%) and Intra-ventricular haemorrhage in 10.7%.

In present study mortality of patients of head injury observed maximum in Intra-ventricular haemorrhage (78.3%), followed by Subdural haematoma (77.4%) and Subarachnoid haematoma (74.4%), it was observed minimum in Epidural haematoma (19.1%). Mortality observed in Cerebral edema, Skull fractures, Intra-cerebral haematoma and Pneumocrani-

um was 48.1%, 28.3%, 51% and 26.3% respectively. Similar observation were made by Gupta P K et al<sup>8</sup>, they reported maximum 79% deaths in Subarachnoid haematoma and 78% and 75.7% deaths in Intra-ventricular and Subdural haematoma respectively. Mortality observed by them was, minimum in Pneumocranium (10.9%) and was 24% in Epidural haematoma.

## CONCLUSION

CT scan findings are found to be helpful in detection and precise location of the parenchymal damage of the brain and helpful to evaluate the outcome. CT scan with evidence of parenchymal damage is predictive of poor functional outcome; other factors associated with poor outcome are intracranial haemorrhage or haematoma and age.

Early detection of level of injury were helpful in early start of management and surgical intervention, which found to be very helpful in improvement of outcome in head injury patients,

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# Study of Obstetric Patients Admitted to Intensive Care Unit at Tertiary Care Centre in Western Uttar Pradesh: One Year Review

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## ABSTRACT

**Introduction:** Pregnancy though physiological and usually uneventful may encounter complications and often needs admission to critical care unit, obstetrics patients are usually young and healthy, by giving short Intensive Care Unit (ICU) care life can be saved. This study aims at evaluating the occurrence, indication of admission and outcome of obstetrics patients admitted to ICU in a tertiary care centre.

**Material and Methods:** A hospital based descriptive observational study was conducted at eight bedded ICU in tertiary care center in western U.P. from August 2014 to July 2015. All obstetric admission to the ICU up to 6 week post partum was included. Data obtained included - demography, indication for ICU admission, intervention at ICU, length of stay and patient out come.

**Results:** A total 109 obstetrics patient required ICU admission during the study period. This accounted for 10.8% of all ICU admissions. The most common mode of delivery was emergency caesarean section. More than half (51.3%) of the patients were admitted due to hypertensive disorder of pregnancy. The cases of obstetric hemorrhage were 38.5%. Severe anemia with Congestive Heart Failure (CHF) was 8.25%.

**Conclusion:** In the light of our experience, a few measures may reduce maternal mortality in developing countries. There is need to recognize that low socioeconomic status, illiteracy, lack of infrastructure and multiparty can vastly influence maternal death. In addition, dedicated ICU in tertiary hospital can ensure early intervention, management, and intensive care to the patient.

**Keywords:** Obstetric Patients, hypertensive disorder of pregnancy

## INTRODUCTION

The need for critical care support in obstetric patient is frequent.<sup>1,2</sup> There are only few studies<sup>2</sup> reporting on critical illness during pregnancy. Complication may arise during pregnancy or in the postpartum period, which can be life threatening.<sup>3</sup> Early intervention and treatment in the ICU can decrease the progression of dysfunction and improve prognosis. Late presentation of patient and paucity of ICU are big problem in Uttar Pradesh (U.P.). Hypertensive disorder is the most common reason for ICU admission. The purpose of this study was to determine the cause and outcome of admission of obstetric patient to the ICU in tertiary care center.

## MATERIAL AND METHOD

A hospital based descriptive observational study was conducted at eight bedded ICU in tertiary care center in western U.P. from August 2014 to July 2015. All obstetric admission

to the ICU up to 6 week post partum were included, data obtained included - demography, indication for ICU admission, intervention at ICU, length of stay and patient out come.

The unit has facility for ventilator care, invasive cardiovascular monitoring, and dialysis unit, managed by well trained anesthesiologists for 24 hours. The admission criteria in ICU were the need of respiratory support or intensive therapy. All obstetrics cases admitted to ICU either from the emergency unit, the obstetric room, or, from the ward and operation theatre were enrolled in the study. Data retrieved include age, parity, mode of delivery vital sign, Glasgow coma scale on admission in the ICU. Other information retrieved were length of stay, mechanical ventilation, oxygen therapy, blood transfusion, ion tropic support and outcome of the patient.

## STATISTICAL ANALYSIS

Simple statistical calculations (as mentioned below) were done in this study.

Percentage Value of a Specified Category – Number of cases of the specified category / Total number of cases x 100.

Statistical analysis was done using statistical tool SPSS 11.0. Unpaired *t*-test were used to infer results.

## RESULT

A total 109 obstetrics patient required ICU admission during the study period. This accounted for 10.8% of all ICU admissions. The most common mode of delivery was emergency caesarean section. More than half (51.3%) of the patients were admitted due to hypertensive disorder of pregnancy. The cases of obstetric hemorrhage were 38.5%. Severe anemia with Congestive Heart Failure (CHF) was 8.25%. Risk factors for admission included lesser gestational age, anemia, poor nutrition, no Ante Natal Care (ANC) visit, and low socioeconomic status.

Mean age was 23 ± 4.6 year, average length of stay in ICU was 3.40 ± 2.05 days. There were 19 case of maternal mor-

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tality, which account for 17.42% of total mortality. No case was referred to other center.

**DISCUSSION**

During the study period obstetric admission to the ICU represented 22% of all admitted obstetrics patient. This result is much higher than some other studies. Out of the total bed occupancy at ICU, obstetric admission accounted for 10.8%. The relatively high admission and complication rate in our study might be due to lack of antenatal visit, illiteracy and low social economic status and dense population of the patient in the district and lack of tertiary care center. Majority of the admission to the ICU were in the post partum period. Majority of the parturient (51.3%) in our study were admitted with hypertensive disorder followed by Obstetric hemorrhage (20.1%). All studies revealed similar result. The higher maternal mortality and morbidity due to Eclampsia in developing countries has been ascribed to late referral, delay in hospitalization, late transportation, unbooked status of pa-

tients and multiple seizures prior to admission.<sup>4</sup> Sepsis and severe anemia with CHF (17.43%) was the third most Common indication for obstetric admission. There was one case of H<sub>1</sub>N<sub>1</sub> with Acute Respiratory Distress Syndrome (ARDS). Other causes of ICU mortality included Acute Renal Failure (ARF), brain hemorrhage, and pulmonary edema (5.50%), which may be due to the fact that we have lot of referral patient from other hospitals which were mismanaged there.

Majority of the patient were admitted postpartum (72%), after cesarean section. This again suggests that operative deliveries are associated with high chances of complication which necessitating ICU admission.<sup>5</sup> A total 83 ( 76.1% ) of our patients received mechanical ventilation which are very much high as compared to a study done in china.<sup>6</sup> The most common indications were acute respiratory failure (52.2%) and hemodynamic failure (23.8%).

The mean duration of stay at ICU was 3.40 ±2.05 days, which is similar to most studies.<sup>1-3</sup> It indicates that most of the patient did not have major complication during their ICU admission. The minimum stay duration was of four hour and maximum was for 20 days. The total ICU mortality was 32% in one year and maternal mortality rate was 17.42%. Most of the patients who died were referred to us from other hospital and had to travel distance of more than 50 kilometer and losing their golden hour. The main complications encountered during stay at ICU were ARDS, ARF, Disseminated Intravascular Coagulopathy (DIC), and Hepatic encephalopathy. These results are similar to a previous study done by Poornima B et al.<sup>7</sup> The percentage of ICU admission related to obstetrics care in our study is comparable to the literature reviewed.<sup>8-16</sup> Our results conclude similar findings to some of the previous studies which have shown that antenatal, natal and post natal period can be complicated by maternal morbidity necessitating intensive care unit admission.<sup>17-19</sup>

**CONCLUSION**

In the light of our experience, a few measures may reduce maternal mortality in developing countries. There is need to recognize that low socioeconomic status, illiteracy, lack of infrastructure and multiparty can vastly influence maternal death. As discussed by Cruz it is found that there is an inverse association between donor blood availability and both maternal mortality ratio and risk of death due to post partum hemorrhage.<sup>6</sup>

In addition, dedicated ICU in tertiary hospital can ensure

<b>Total Number of Cases</b>	<b>109</b>
Mean duration of admission (Days)	3.40±2.05
Age (Year)	23 ±4.6
Parity	
a) Multigravida	83
b) Primigravida	26
Ante Natal Care attendance	37
Ante partum admission	30
Postpartum admission	79
<b>Table-1: Characteristic of Obstetric Patient Admitted at ICU</b>	

Serial Number	Diagnosis	Number Admitted	%
1	Eclampsia	42	38.5%
2	Obstetric hemorrhage	22	20.1%
3	Severe PET	14	12.8%
4	Ruptured uterus	5	4.58%
5	Sepsis	10	9.12%
6	Post CPR	1	0.91%
7	Severe anemia	9	8.25%
8	Other	6	5.50%
10	Total	109	
CPR – Cardiopulmonary Resuscitation, PET – Pre Eclamptic Toxaemia.			
<b>Table-2: Indication for Admission in the ICU</b>			

Serial Number	Admission Diagnosis	Number Admitted	Number Survived	Number Died	Percentage Mortality%
1	Eclampsia	42	38	4	9.5%
2	Obstetric Hemorrhage	22	17	2	9.09%
3	Severe PET	14	12	2	14.2%
4	Rupture Uterus	5	4	1	20.0%
5	Sepsis	10	7	3	30.0%
6	Post CPR	1	0	1	100%
7	Severe Anemia	9	6	3	33.0%
8	Other	6	5	1	16.0%
<b>Table-3: Outcome of Admission of the Obstetric Patients</b>					

ICU Intervention	Number of Cases
Mechanical ventilation	83
Blood and blood product transfusion	36
Antihypertensive	64
Anticonvulsant	64
Observation	
DIC	3
ARF	2
ARDS and Pulmonary edema	5
Hepatic Encephalopathy	1
DIC - Disseminated Intravascular Coagulopathy; ARDS - Acute Respiratory Distress Syndrome. ARF - Acute Renal Failure.	
<b>Table-4: Interventions and Complications during stay</b>	

early intervention, management, and intensive care to the patient.

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# Comparative Evaluation of Surface Colonization of Candida on Three Different Denture Base Materials - An In Vivo Study

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## ABSTRACT

**Introduction:** Over the years researchers have reported on the frequency and distribution of yeast in the oropharynx of apparently normal individuals and those with systemic or mycotic diseases wearing dentures. This in-vivo study was conducted at the department of Prosthodontics, Sharad Pawar Dental College, Sawangi (Meghe), Wardha to evaluate the growth of candida on three different denture base materials (Heat cure acrylic resin, Chrome cobalt alloy, Flexible denture material velplast) and their subspecies growth in each material. A comparative evaluation was also carried out to identify least growth and sub species among these different denture base materials.

**Materials and Method:** Three different denture base materials dentures were made and delivered to patients. Swab was taken after 1 month and after 3 months of denture insertion. Samples from rugae area and tissue surface of all three different types of denture materials denture of all patients were inoculated on individual petri dishes containing Sabouraud's Dextrose Agar. (SDA, Himedia- India) and Petri dish were separated according to different denture base materials swab. (Group A, Group B, Group C). Culture preparation and growth of Candida Albicans on the specimens was conducted and sub species identification was done using KB006 Hi media subspecies identification kit.

**Results:** Mean number of colonies for heat cure acrylic material at 1 month was  $45 \pm 6.86$  and at 3 months it was  $97 \pm 12.02$ , Mean number of colonies for Flexible denture material at 1 month was  $12.80 \pm 4.80$  and at 3 months it was  $22.50 \pm 6.16$ , Mean number of colonies for Chrome cobalt base metal alloy at 1 month was  $7.00 \pm 2.30$  and at 3 months it was  $13.50 \pm 3.02$ , along with different subspecies of candida in three different denture base materials.

**Conclusion:** From our present study, it can be concluded that Chrome cobalt alloy showed less adherence to candidal cells, followed by Flexible denture material (velplast) and last Heat cure acrylic resin. The results were statistically highly significant.

**Keywords:** Surface colonization of Candida, denture associated stomatitis, Denture base materials.

ture irritation hyperplasia, flabby ridges and oral carcinomas. Denture related stomatitis indicates an inflammatory process of the mucosa that bears a complete or partial dental removable appliance, typically a denture.<sup>2</sup>

"Denture Stomatitis" is a form of mild chronic erythematous candidiasis. It usually has a predisposition for middle aged or elderly denture wearing individuals as erythema is limited to the area beneath the maxillary denture. Presence of the denture is the only etiologic factor to these situations and not caused by any allergy to the denture material. Denture associated stomatitis is associated with variety of candida.<sup>2</sup>

"The beginning of the rational systematic of the non- ascosporogenous yeasts". The most important oral yeasts belong to the genus candida. Candida albicans is the predominant yeast species, followed by candida glabrata, candida krusei, candida tropicalis, candida guilliermondii, candida kefyr, and candida parapsilosis<sup>3-5</sup>

The human oral cavity is known to harbour multitude of organisms. Amongst them, candida albicans has lately become a cause of great concern to dental professionals. It has been coined as opportunistic pathogen amongst the candida species<sup>6</sup> since it is the most frequent fungal opportunistic pathogen in humans.

Denture stomatitis is the most common infectious disease affecting the palatal mucosa. The unpolished surface of the denture is a suitable location for candidal proliferation owing to its rough surface. The surface roughness of denture enhances the likelihood of microorganisms to remain on the surface after the prosthesis has been cleaned, thus allowing continuous re-infection of palate.

Denture wearing is a predisposing factor for oral colonization by candida and its prevalence can increase from 60-100%.<sup>7,8</sup> The microenvironment, formed under the denture, is protected from the washing action of saliva to remove debris and microorganisms.<sup>9,10</sup>

This is dependent on the initial attachment to the denture impression surface, which in turn depend on the physical

## INTRODUCTION

The oral cavity may act as a habitat for several pathogens related to systemic infections.<sup>1</sup> Dental Prosthesis causes an alteration in the oral micro flora. Lesions of the oral mucosa associated with the wearing of dentures may represent acute or chronic reactions to microbial denture plaque, a reaction to constituents of the denture base material, or a mechanical denture injury. These lesions constitute a heterogeneous group with regard to pathogenesis. They include stomatitis caused by dentures, angular cheilitis, traumatic ulcers, den-

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properties of the material surface, such as porosity, surface free energy, hydrophobicity and roughness. These variables are all influenced by the polymerization method, material used, and any surface modifications. For instance, candida adhesion to PMMA- based resin is a common source of oral cavity infection.

Many studies stated that the probability of acidic pH prevailing beneath the maxillary denture may potentiate the palatal inflammation associated with denture stomatitis.<sup>11</sup>

Therefore this study was carried out to evaluate and compare the least growth of candida and their subspecies in three different denture base material (Heat cure acrylic resin, chrome cobalt alloy, and flexible denture material velplast). Null hypothesis of the study is that there is no difference in time dependent surface colonization of candida in three different denture base materials. Alternative hypothesis would be that there is difference in time dependent surface colonization of candida in three different denture base materials.

## MATERIALS AND METHODS

### Materials used in the study

Three types of denture base materials:- Heat cure acrylic resin (DPI), Chrome cobalt base metal alloy (Wironit), Flexible denture material (velplast), Sabouraud's Dextrose Agar, KB006 Hi Candida Identification kit, Swab sticks, Colony counter, Inoculating loop, Light microscope, Incubator, Induction casting machine, Acrylizer.

### Selection of cases

Study was conducted on different patients wearing removable partial denture made up of three different types of materials i.e. Heat cure acrylic resin denture base material, flexible denture base material(velplast) and Cast partial denture base material, which was delivered to the patients 1 month and 3 months prior to the study.

### Exclusion criterias

- Patient should not be a previous denture wearer.
- Patients having Gingival and Periodontal disease.
- Patients suffering from systemic conditions like uncontrolled diabetes, hypertension, hyperthyroidism and other cardiovascular disorders.

### Methodology

Comparative study of surface colonization of candida on all the three denture base materials and their culture preparation was conducted in Sharad Pawar Dental College, Sawangi (M), Wardha.

Sample collection was done using oral swab technique. Oral swabs were collected from rugae portion of hard palate of patients and tissue surface of upper denture of all three denture base material's denture according to a 2cm x 2cm template delimiting the area to be swabbed covered by denture. This was done immediately after removing of the denture (Fig 1,2) For each patient, SDA was inoculated and medium was incubated at 37°C for 48 hours. After completion of incubation period, the specimens were removed using sterile

forceps to avoid any contamination.

Growth on SDA within 24-48 hrs at 37°C was identified as candida species. Colony counting was done with the help of colony counter to identify the growth and number of colonies in all the three materials after 1 month and 3 months (Fig 3-5). Staining was done using Gram staining technique. Specimens were washed in water and the stained smear was allowed to dry in air. A drop of cedar-wood oil was placed over the specimen on the glass slide and observed under oil immersion lens (1000x) of microscope.

Microscopically, Gram positive yeast cells are dark purple and show characteristic budding which is considered positive for candida (Fig 6). Germ Tube Test (Raynauld's-Braude Phenomenon) was carried out. This rapid screening procedure was done for observing germ tube production which identifies and differentiates *C. albicans* and *C. dubliniensis* from other candida species. SUB SPECIES IDENTIFICA-



Figure-1: Swab from rugae area



Figure-2: Swab from tissue surface of denture

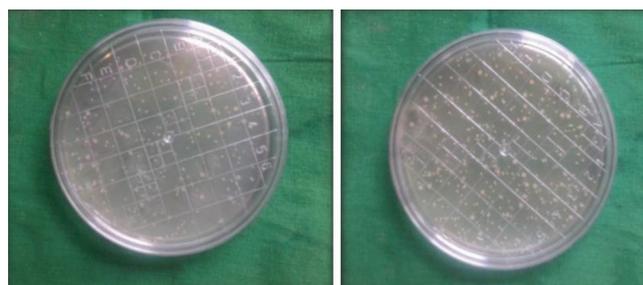


Figure-3: Growth after 1 month swab in Heat cure acrylic material; Growth after 3 month swab in Heat cure acrylic material

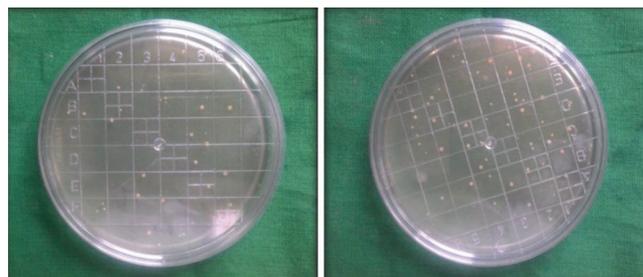


Figure-4: Growth after 1 month swab in Flexible denture material (Velplast); Growth after 3 month swab in Flexible denture material (velplast)

TION was done using KB006 HI Candida™ Identification kit (stored at 2-8°C Shelf life is 12 months). KB006 is a standardized test system that can be used for identification and differentiation of candida species. Each KB006 kit is a standardized calorimetric identification system utilizing twelve conventional biochemical tests. The tests are based on the principle of pH change and substrate utilization. On incubation, organisms undergo metabolic changes which are indicated by a spontaneous colour change in the media. (Fig 7-9)

**STATISTICAL ANALYSIS**

The statistical tests used for the analysis of the result were: Students paired t test, way ANOVA, Multiple Comparison Tukey Test, Chi square Test. Results were procured with the help of SPSS software version 21.

**RESULTS**

Mean number of colonies for heat cure acrylic material at 1 month was 45 ± 6.86 and at 3 months it was 97 ± 12.02. Mean number of colonies for Flexible denture material at 1 month was 12.80 ± 4.80 and at 3 months it was 22.50 ± 6.16. Mean number of colonies for Chrome cobalt base metal alloy at 1 month was 7.00±2.30 and at 3 months it was 13.50 ± 3.02.

For heat cure acrylic material:- By using student’s paired t-test statistically significant difference was found in mean number of colonies at 1 and 3 months (t=12.17,P-value=0.000)

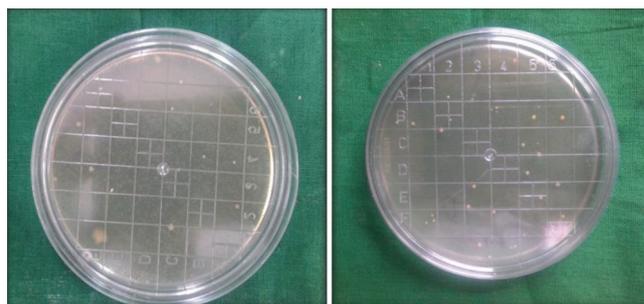
For Flexible denture material:- By using student’s paired t-test statistically significant difference was found in mean number of colonies at 1 and 3 months (t=11.15,P-value=0.000)

For Chrome cobalt base metal alloy:- By using student’s paired t-test statistically significant difference was found in mean number of colonies at 1 and 3 months (t=9.04,P-value=0.000) (Table 1, Graph 1)

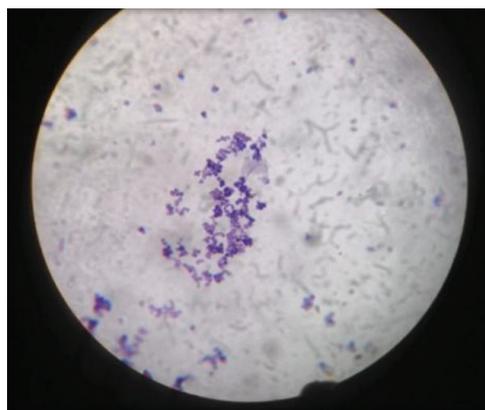
C. Albicans was present in all 100% patients, C.famata in 40% and C. Glabarata was present in 50% of the patients. By using Chi Square test statistically significant difference was found in three subspecies (x²=8.90, p=0.011)( Graph 2) C. Albicans was present in all 30% patients, C.Krusei in 70% and C. Glabarata was present in 20% of the patients. By using Chi Square test statistically significant difference was found in three subspecies (x²=8.14, p=0.014) (Graph 3) C. Albicans was present in all 100% patients, C. Glabarata in 30% and C. Famata was present in 10% of the patients. By using Chi Square test statistically significant difference was found in three subspecies (x²=17.95, p=0.0001) (Graph 4)

**DISCUSSION**

Edentulousness is not a disease entity by itself but is a consequence of aging and pathology. The incidences of edentulousness have questioned the adequacy of dental treatments. The treatment objectives of such individuals with artificial prosthesis is not only to restore the function of mastication



**Figure-5:** Growth after 1 month swab in Chrome cobalt alloy material; Growth after 3 month swab in Chrome cobalt alloy material



**Figure-6:** Gram positive dark purple yeast cells with budding, shows positive for candida.



**Figure-7** Positive for candida krusei, candida albicans and candida Glaberata in flexible denture material (Velplast)



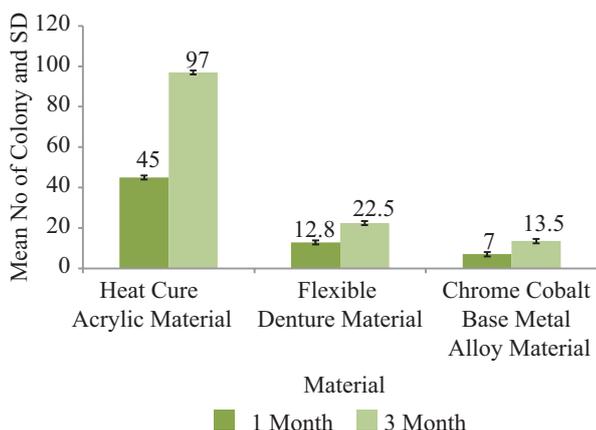
**Figure-8:** Positive for candida Famata, candida albicans and candida Glaberata in Chrome cobalt alloy material.



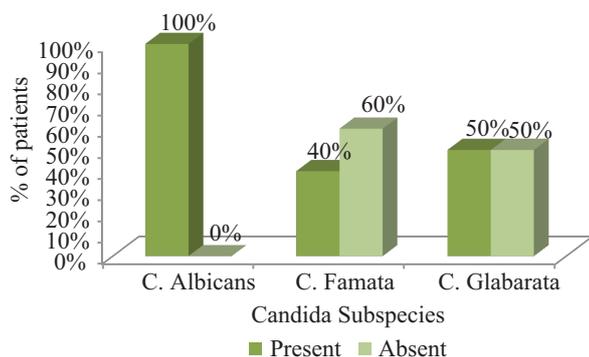
**Figure-9:** Positive for candida Famata, candida albicans and candida Glaberata in Heat cure acrylic material.

Material	Month	Mean	N	Std. Deviation	Std. Error Mean
Heat Cure Acrylic Material	1 month	45.00	10	6.86	2.17
	3 month	97.00	10	12.02	3.80
Flexible Denture Material	1 month	12.80	10	4.80	1.51
	3 month	22.50	10	6.16	1.95
Chrome Cobalt Base Metal Alloy Material	1 month	7.00	10	2.30	0.73
	3 month	13.50	10	3.02	0.95

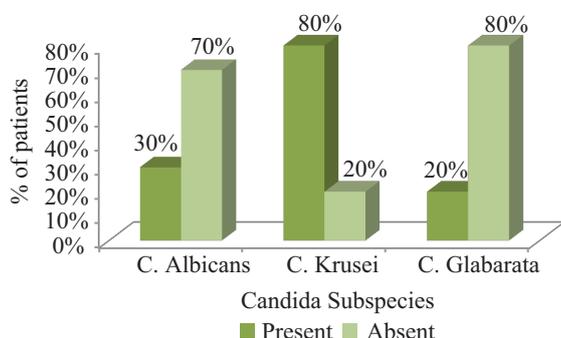
**Table-1:** Comparison of surface colonization of candida in three materials Descriptive Statistics



**Graph-1:** Comparison of surface colonization of candida in three materials

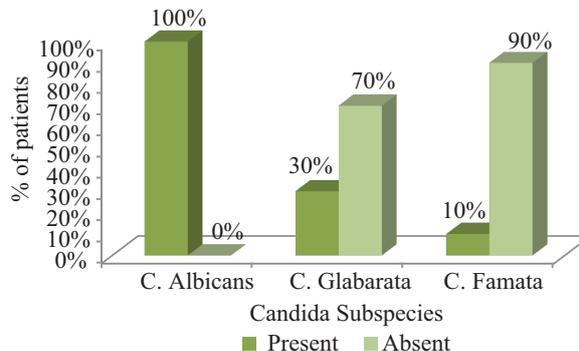


**Graph-2:** Identification of sub species of candida in heat cure acrylic material



**Graph-3:** Identification of sub species of candida in flexible denture material

but also to provide acceptable esthetics, improved phonetics and rehabilitation of these patients back to society with elevated level of confidence and comfort.<sup>1</sup> The material used for making the dentures are metallic and



**Graph-4:** Identification of sub species of candida in Chrome Cobalt Base Metal Alloy Material

non metallic in nature. Majority of complete denture prosthesis are fabricated using acrylic resin due to its good qualities including ease of manipulation and also the cost. The denture bases have three surfaces i.e. tissue surface, polished surfaces and occlusal surfaces. All these surfaces have lots of uneven configuration which will allow food and debris to get accumulated.

Oral conditions particularly associated with wearing of dentures is denture associated stomatitis (DAS) or denture related stomatitis. According to Nikawa et al., the term “denture related stomatitis” would be preferable to “denture induced stomatitis”, since the inflammation of (palatal) mucosa is not induced by the denture, but by wearing the denture or by plaque on the denture.

Candidiasis is caused by infection with species of the genus *Candida*, predominantly with *Candida albicans*. *Candida* species are ubiquitous fungi that represent the most common fungal pathogens that affect humans.

Candidal colonization was seen in 95% of denture wearers, which is in accordance with the study done by Sylvie LA, Jean PG, Noella in 2007. In non denture wearers, 75% showed candidal growth due to poor oral hygiene and poor maintenance of denture, which is consistent with the study done by Daniluk et al in 2006. So this present study was carried by taking candida into consideration than other microbes and their growth variation in denture wearers.<sup>12</sup>

Numerous yeasts are commonly found on the palatal surface of denture and this lends support to the theory that the upper denture act as a reservoir of infection.<sup>6</sup>

Removable denture wearers, especially elderly edentulous patients have poor or low level of oral hygiene practice due to physical health, occupation and social background. Wearing of dentures produces a micro environment conducive to the growth of candida with low oxygen, low pH, and an an-

aerobic environment.

Therefore, aim of our study is to comparatively evaluate the growth of surface adherence of *Candida* to three commonly used denture base materials. The three denture base materials used for this study were Heat cure acrylic resin, Flexible denture material (velplast) and chrome cobalt alloy denture base material. Comparative evaluation of surface colonization after 1 month and after 3 months post insertion of denture shows a significant difference of colonization, found to be less in chrome cobalt alloy as compared to flexible denture material and as compared to heat cure acrylic resin material. In this study we use KB006 HI *Candida*<sup>TM</sup> Identification kit to identify the type of candidial subspecies which grow in different types of denture base material. No such type of study was carried out before.

The result of our study shows the presence of various types of subspecies in different denture base materials used in this study.

### Scope of the present study

There is a scope for further exploration of the materials used for making denture bases which shows least adherence for microbial buildup in relation to oral cavity.

Various subtypes were also identified. These subtypes have been proven to be resistant to various anti-fungal drugs so sub-typing is necessary for the effective management of the disease and to avoid systemic candidemia and disseminated infections which are fatal in nature.

### Limitations of the present study

In the present study we have not used molecular method for identification and confirmation of the subtypes of *Candida*. The present study had been carried out with limited number of samples.

## CONCLUSION

Denture stomatitis is more frequent in patients with poor denture hygiene. Therefore, the patients should be instructed carefully on denture hygiene and denture cleaning habits. Chrome cobalt alloy denture base material showed less adherence of *Candida* colonies compared to heat cure acrylic resin material where as Flexible denture velplast showed fewer adherences of *Candida* as compared to heat cure acrylic resin material but more as compared to chrome cobalt alloy material.

This study has clearly given us the idea about the important effects of different surface roughness, chemical, physical and hydrophobic properties of different denture base materials on candidal adhesion.

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# Benign Looking Malignant or Malignant Looking Benign? - The Final Verdict in Postmenopausal Bleeding: A Prospective Observational Study

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## ABSTRACT

**Introduction:** Postmenopausal bleeding (PMB) accounts for 5% of gynaecology presentations. Generally, 4 to 11 percent of postmenopausal women will experience bleeding. The aim of the study was to determine the causes of postmenopausal bleeding and to compare the transvaginal sonographic finding with the histopathological examination results.

**Material and Methods:** A prospective observational study was conducted among 131 patients with postmenopausal bleeding who attended Gynaecology clinic at Kasturba Medical College, Manipal. The causes of postmenopausal bleeding was noted. The transvaginal sonographic finding was compared with histopathological examination results.

**Results:** The mean age of patients presenting with postmenopausal bleeding was 62.4±7.5 years. Postmenopausal bleeding (PMB) was more common in multiparous women. The most common cause of postmenopausal bleeding was found to be proliferative endometrium, followed by endometrial polyp. Most of the cases that were diagnosed as endometrial polyp, simple hyperplasia, proliferative endometrium and carcinoma endometrium revealed thick endometrium on ultrasound. Majority of the cases that were diagnosed as endometrial polyp, proliferative endometrium and simple hyperplasia revealed a normal sized uterus by scan, however a good number of cases showed even bulky uterus. Patients diagnosed with carcinoma endometrium by histopathology had even a normal sized and atrophic uterus.

**Conclusion:** Fractional curettage has to be done in any patient presenting with postmenopausal bleeding despite a finding of atrophic uterus or thin endometrium by ultrasound.

**Keywords:** Postmenopausal bleeding, Transvaginal sonography, Fractional curettage.

## INTRODUCTION

Postmenopausal bleeding (PMB) is defined as uterine bleeding that occurs atleast one year after menopause. PMB is a common problem that is frequently encountered in hospital settings.<sup>1,2</sup> The incidence of PMB is around 10% in the general population.<sup>3</sup> PMB is usually associated with abnormalities of the endometrium, either benign or malignant. The reported incidence of endometrial carcinoma in women with PMB is 10–15%.<sup>4,5</sup> In the patients who present with PMB and an increased endometrial thickness, the reported prevalence of endometrial polyps was found to be approximately 40%.<sup>6</sup> In developed countries, endometrial carcinoma was found to be the most common malignancy of the gynaecological malignancies.<sup>7</sup> Endometrial carcinoma often presents at an early stage, hence the patient could undergo hyster-

ectomy which is a curative treatment in the initial stages. Timely diagnosis of endometrial carcinoma is significantly important since the survival rate in these patients decreases with increased staging and lower histological differentiation. In any patient with PMB we should aim to exclude cervical cancer, endometrial carcinoma or precancerous lesions of the endometrium.<sup>8</sup> Transvaginal sonography is the first modality of investigation which is performed in these patients, though it may be sometimes inconclusive and rarely misleading. Fractional curettage is the next step in the diagnosis of patients with PMB which is done to rule out malignant or premalignant conditions. The objective of this study was to know the causes of postmenopausal bleeding and also to compare the ultrasound finding with histopathological examination results.

## MATERIAL AND METHOD

A total of 131 consecutive patients presenting with spontaneously occurring PMB after one year of menopause were included in the study. Women having undergone hysterectomy and bilateral salpingo-oophorectomy, receiving radiotherapy or chemotherapy, suffered trauma to the genital tract, having coagulation disorder or on anticoagulant or hormone replacement therapy were excluded. The study was carried out in the Department of Obstetrics and Gynaecology, Kasturba Medical College, Manipal between January 2014 to December 2015. An informed consent was obtained and complete medical history was taken. Physical examination was conducted and relevant laboratory investigations were carried out. Transvaginal ultrasound was performed to note the size of uterus, endometrial thickness and possible presence of any adrenal masses. Fractional curettage was done depending on examination findings. Histopathological examination results were analysed. The causes of postmenopausal bleed-

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ing was noted and the ultrasound finding was compared with the histopathological examination results.

**STATISTICAL ANALYSIS**

The data was analysed in frequency and percentages. Continuous variables were summarized as mean and standard deviations. The categorical variables were expressed in percentages.

**RESULTS**

The mean age of patients presenting with postmenopausal bleeding was 62 years. Postmenopausal bleeding (PMB) was more common in multiparous women (91.6%) compared to nulliparous women (8.39%). PMB was seen approximately 8 years after menopause in these women. Medical co-morbidities like diabetes mellitus, hypertension and obesity were present in 27.48% of cases [Table 1].

The most common cause of postmenopausal bleeding was found to be proliferative endometrium (23.7%), followed by endometrial polyp (19.8%). Other major causes of postmenopausal bleeding were carcinoma cervix(12.2%), chronic cervicitis(8.4%), chronic non-specific endometritis(7.6%) and carcinoma endometrium(6.9%) [Figure 1].

Endocervical curettage was done in patients with suspected endometrial abnormality. Histopathological examination of these samples revealed endometrial polyp (27.1%) as the most common endometrial cause of postmenopausal bleeding, followed by proliferative endometrium (17.7%) and carcinoma endometrium (9.4%) [Figure 2].

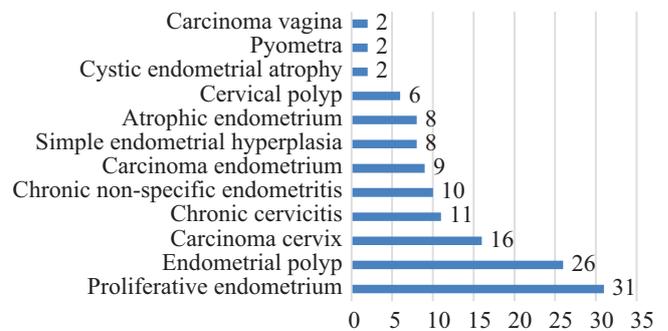
The cases finally diagnosed as carcinoma endometrium revealed a wide range of endometrial thickness by ultrasound (< 5mm to > 20mm), however it was more commonly associated with thick endometrium. Most of the cases that were diagnosed as endometrial polyp, simple hyperplasia and proliferative endometrium revealed thick endometrium on ultrasound. One case of atrophic endometrium had an endometrial thickness of 10mm and one case of cystic atrophy had an endometrial thickness of 23mm which was unusual [Figure 3].

The cases diagnosed as carcinoma endometrium by an initial scan showed both bulky and normal sized uterus and one case showed an atrophic uterus. Majority of the cases that were diagnosed as endometrial polyp, proliferative endometrium and simple hyperplasia revealed a normal sized uterus by scan, however a good number of cases showed even bulky uterus. One case of cystic atrophy revealed bulky uterus by scan which was unusual [Figure 4].

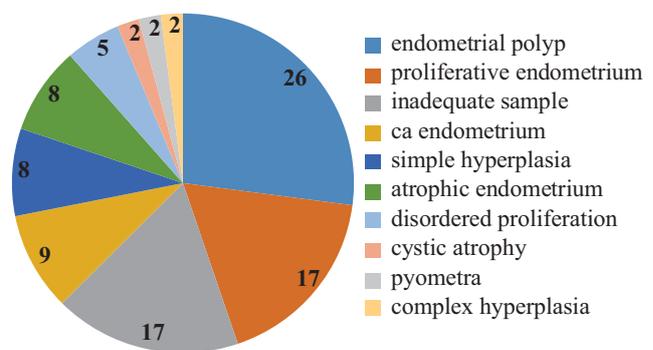
**DISCUSSION**

The mean age of patients presenting with postmenopausal bleeding at presentation was 62.4±7.5 years which is similar to other reports.<sup>9,10</sup> A wide variety of benign causes were observed related to uterus, cervix and vagina consistent with other studies.<sup>11</sup> Amongst benign causes proliferative endometrium was the most common followed by endometrial polyp as in many other studies.<sup>12</sup> However, chronic cervicitis has

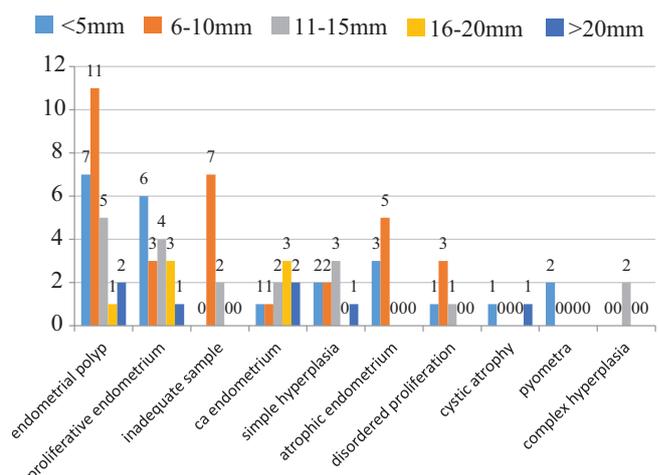
<b>Age (years)(mean±SD)</b>	<b>62.4±7.5</b>
Nullipara	11(8.39%)
Multipara	120(91.6%)
Postmenopausal period (years) (mean±SD)	8.4±6.9
Medical Co-morbidities	36(27.48%)
<b>Table-1: Demographic Characteristics of patients with postmenopausal bleeding (n=131)</b>	



**Figure-1:** Etiology of postmenopausal bleeding (n=131).

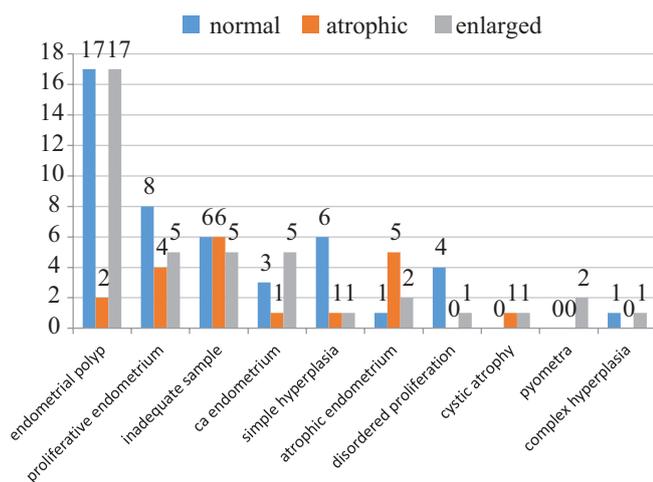


**Figure-2:** Analysis of Histopathological examination (HPE) results of endocervical curettage (n=96)



**Figure-3:** Co-relation of endometrial thickness by ultrasound with Endometrial sample HPE results (n=96)

also been seen as the predominant cause in few studies.<sup>11</sup> The differences could be real, based on different patterns of diseases according to geographic or ethnic differences or simply because of different selection criteria among various study populations. In order to clarify these differences, larger multicentre studies would be required. Endometrial polyp should



**Figure-4:** Co-relation of size of uterus by ultrasound with endometrial sample HPE results (n=96)

be removed to prevent malignant change. Simple hyperplasia can be treated with medicines but atypical hyperplasia requires surgical management. The reported incidence of malignancy in postmenopausal women has major differences in different population groups. It has been as low as 1–1.5%<sup>13</sup> in Jewish women probably due to low incidence of carcinoma cervix to as high as 54%<sup>14</sup> in African women. In our study incidence of malignancy was 20.6% inclusive of carcinoma cervix, endometrium and vagina. The risk factors for endometrial carcinoma include obesity, hormones, tamoxifen, diabetes and hypertension.<sup>15</sup> The risk of endometrial carcinoma increases with age with approximately 1% at age of 50 years to 25% at age 80.<sup>16</sup> The ratio of carcinoma endometrium to carcinoma cervix in this study was 1:2, which was in reverse order to the study conducted in Jewish population.<sup>17</sup> Rare causes of PMB have been reported in literature such as pinworm infestation, primary vaginal malignant melanoma or its urethral metastasis, hydatidiform mole, leiomyosarcoma, non-caseating sarcoid granuloma and genital tract tuberculosis which is responsible for approximately 1% cases.

## CONCLUSIONS

The most common cause of postmenopausal bleeding after having excluded carcinoma cervix, is proliferative endometrium followed by endometrial polyp as per our study. An initial ultrasound may falsely give an impression of endometrial carcinoma in view of findings of bulky uterus or thick endometrium. It must be asserted that despite a finding of atrophic uterus or thin endometrium by ultrasound, a fractional curettage must be done. When it comes to postmenopausal bleeding, prediction could go wrong as looks may be deceptive. Rare causes can be rarely possible.

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## C O N T E N T S

1. **A Comparative Study of Levobupivacaine with Fentanyl and Levobupivacaine with Dexmedetomidine in Thoracic Epidural Block for Laparoscopic Cholecystectomy**  
*Aditya Kumar Kejriwal, Malti Agrawal, Gopalkrishan, L.S. Kang, Karandeep Singh, Anand Yadav, Rajeev Kumar, Sarfaraz Ahmad, Rampal Singh* 319-323
2. **Color Doppler Study of Carotid Arteries in Transient Ischemic Attack and Stroke**  
*Avadhesh Pratap Singh Kushwah, Yogesh Patel, Sonjay Pande* 324-328
3. **The Growing Epidemic of MDR- TB and Concerns for Global Health Security**  
*Vijay Kumar Chattu, Soosanna Kumary* 329-331
4. **Assessment of Serum Paraoxonase1 Activity in Diabetic Retinopathy Patients**  
*Aliya Nusrath, Namitha D, N Asha Rani, Rajeshwari A, Prathibha K* 332-335
5. **Odontogenic Keratocyst (OKC) as Tumor: A Surgeons Dilemma between Resection and Recurrence**  
*Vivek Kumar, Avanindra Kumar, Soumen Mandal, Anupam Kumar* 336-338
6. **Comparative Evaluation of Effect of Different Dairy Products on Salivary pH – An In-Vivo Study**  
*Vaibhav Kamal, Avanindra Kumar, Kamna Gorka, Sanjeev Kumar, Shraddha Rani, Avinash* 339-341
7. **Clinical Applications of Precision Attachments: A Review**  
*Shraddha Rani, Sanjeev Kumar, Prathibha, Vivek Kumar* 342-346
8. **Prevalence and Clinical Significance of Cardiac Murmurs Detected During Routine Neonatal Examination**  
*Shafat Ahmad, Vamiq Rasool, Sabha Rasool* 347-350
9. **Knowledge and Attitude Towards Diabetes among Rural and Urban Population of Nasik District of Maharashtra**  
*Kapil Palekar, Sushil Ahire, Rohan Suhas Bhambar* 351-353
10. **Corneal Endothelial Cell Damage During Manual Small Incision Cataract Surgery**  
*Gautam Paul, Y Shailendra Singh, Chokkahalli K Nagesha, Asish K Deb* 354-357
11. **A Prospective Study on the Pattern and Outcome of Penetrating Eye Injuries in a Tertiary Care Hospital**  
*Juliana Rositta Stephen, Loganathan M, Vasudev Anand Rao, Thyagarajan P* 358-360
12. **Bart's Syndrome with Unilateral Choanal Atresia**  
*Fairy Susan Varghese, Sunil K Agarwalla, Geetanjali Sethy, Pranab K Pan* 361-363
13. **A Study on Foreign Bodies in Air and Food Passages**  
*P Narender Goud, Abdul Azeez Vallur* 364-366
14. **Classical Variant of Myofibroblastoma - A Rare Case Report with Review of Literature**  
*B Pavani, E Jaya Shanker, Ashwin Shah, M. Srinivas* 367-369
15. **Awareness and Knowledge of Risk in Radiation Exposure among Health Care Professionals: A Hospital Based Survey**  
*Apurva Vohra* 370-373
16. **Radiological Monitoring Equipments at Medical Workplace**  
*Aditi Dogra* 374-376
17. **Multiple Supernumerary Teeth in Non-Syndromic Patient- A Case Report and Review of Literature**  
*Pankaj Gupta, Chaya M David, Manasa Anand Meundi, Abhishek Dubey* 377-380
18. **Emotional Disturbances in Diabetes Mellitus**  
*N.L. Dinker, Ashwani Saini, Sonam Maheshwari* 381-384
19. **Prevention Role of Metoclopramide, Ondansetron and Granisetron for Postoperative Nausea and Vomiting ( PONV) in Patients Undergoing Tonsillectomy – A Prospective Randomized Study**  
*Vijaya Kumar T, Kiran Kumar H* 385-389

<b>20. Thigh Hematoma Following Oral Anticoagulant Therapy: A Case Report</b>	
<i>Sameeraja Vaddera, Lubna Shafi, Ramesh G Reddy, Sreevani Gayatri, N. Vijay Krishna</i>	390-392
<b>21. Comparative Study of Attenuation of Cardiovascular Responses to Laryngoscopy and Intubation, Employing MgSO<sub>4</sub> Vs Normal Saline - A Randomized Double Blinded Study</b>	
<i>Kiran Kumar H, Vijaya Kumar T</i>	393-396
<b>22. Postnatal Morphometric Study of Placenta in Normal and Anaemic Pregnancy</b>	
<i>SB Parate, JV Deshpande, MP Parchand, DK Chopade</i>	397-401
<b>23. Psychiatric Morbidity in Hypothyroid Patients</b>	
<i>N. L. Dinker, Shruti Sharma</i>	402-405
<b>24. Correlation between Oxidative Stress and Chronic Kidney Disease in Thyroid Disorders</b>	
<i>Jyoti Batra, Suyash Saxena, Sudeep Kumar, Manisha Baghel</i>	406-409
<b>25. Comparative Study of Intra-Cervical Foley's Catheter and Intra-Cervical PGE<sub>2</sub> Gel For Pre-Induction Ripening of Cervix</b>	
<i>Penagaluru Radha, Yaragani Padma, P Padmaja</i>	410-414
<b>26. Randomized Control Study of 600 mcg Oral vs Vaginal Misoprostol with Mifepristone for early MTP</b>	
<i>Rishika Raj, Anup Pradhan</i>	415-419
<b>27. Frequency of Blood Group Distribution in the Donors given Blood in a Tertiary Medical Center, Kolkata, West Bengal, India</b>	
<i>Ashis Kumar Saha, Kausik Munsii, Payodhi Dhar</i>	420-423
<b>28. Haemangioma of the Left Lateral Surface of Tongue, In an Adult Patient: A Rare Case Report</b>	
<i>Sadam Srinivasa Rao, Sukhvinder Bindra, K.V. Ramana Reddy, Sunil Kumar Singh</i>	424-426
<b>29. A Study of Different Surgical Treatment in Otitis Media with Effusion</b>	
<i>Hiranya Prova Saikia, Pradip Kumar Tiwari</i>	427-430
<b>30. Clinical Phenomenology of OCD: A Study from Kashmir</b>	
<i>Mohammad Maqbool Dar, Majid Shafi Shah, Fazl E Roub, Mohd Altaf Paul, Shahid Sulayman</i>	431-434
<b>31. Early Versus Delayed Deworming in Cases of Roundworm Intestinal Obstruction in Pediatric Population –Experience from a Tertiary Care Centre in the Kashmir Valley</b>	
<i>Kumar Abdul Rashid, Iqbal Salim Mir, Mudassir Farooq Hajini, Sheikh Viqar Manzoor, Amat-us-Samie, Farooq Ahmad Dar</i>	435-437
<b>32. Comparison of Effect of Ondansetron VS Palonosetron in Prevention of Postoperative Nausea and Vomiting Following Laparoscopic Surgery</b>	
<i>Uma Kuragayala, Syed Abid Ali, Radharamana Murty K</i>	438-441
<b>33. A Controlled Comparison between Betamethasone Gel and Lidocaine Jelly Applied Over Tracheal Tube to Reduce Postoperative Sore Throat, Cough and Hoarseness of Voice</b>	
<i>Uma Kuragayala, Sriram Ravinutala, Radha Ramana Murthy K</i>	442-446
<b>34. The Relationship Between Lipid Profile and Hypertension</b>	
<i>D. Rajashree, R. Anitha, K. Prashanth</i>	447-450
<b>35. A Study on Estimation of Blood Loss During Third Stage of Labour in Relation to Total Blood Volume in A Tertiary Care Hospital, Niloufer, Hyderabad</b>	
<i>T. Subhasini</i>	451-453
<b>36. Clinical Study and Management of Peritonitis</b>	
<i>Sharanbasappa</i>	454-457
<b>37. Study of QT – Dispersion in ECG in Patients with Acute Cerebrovascular Accidents or Stroke</b>	
<i>Janki Punekar, Amit Anurag Singh, Kalu Singh Rawat</i>	458-461
<b>38. Rare Presentation of Ewings Sarcoma in Sinonasal Region: A Case Report</b>	
<i>John Winkle Medida, Joseph Benjamin Gandhi, Bala Sankar Ramavath, Fatema</i>	462-465
<b>39. Tumoral Calcinosis- A Rare Case Report</b>	
<i>Korumilli Ramesh Kumar, S. Rama Chandra Reddy, M. Siddhartha Reddy, D. Murali Krishna</i>	466-467
<b>40. CBCT based Comparison of Condylar Postion in Hypodivergent and Hyperdivergent Facial Skeletal Pattern</b>	
<i>Ajoy Kumar Shahi, Subhash Chandra, Anurag Rai, Amesh Golwara</i>	468-472
<b>41. An In-vitro Comparative Evaluation of Shear Bond Strength of Different Self-Etch Dentin Bonding Agents</b>	
<i>Ruhani Cheema, Ekta Choudhary</i>	473-478

<b>42. Molar Incisor Hypomineralization: A Review</b> <i>Vikram Jhamb, Yoginder Yadav</i>	479-482
<b>43. Vitamin D and Calcium v/s Bisphosphonates in the Secondary Prevention of Osteoporosis and Prevention of Osteoporotic Fractures Following a Low Energy Fracture</b> <i>Mohammad Iqbal Wani, Arshad Bashir, Faisal Younis Shah</i>	483-486
<b>44. Effect of Thiopentone and Propofol on Intraocular Pressure</b> <i>C. B. Sridhar, M. Dinesh Kumar</i>	487-488
<b>45. Medical College Hospital</b> <i>Menon Narayanankutty Sunilkumar, Vadakut Krishnan Parvathy</i>	489-492
<b>46. Status of Insulin Resistance and Interleukin-6 (IL-6) in Type- 2 Diabetic Subjects in Eastern Uttar Pradesh of India</b> <i>Dharmveer Sharma, Poonam Gupta, Shweta Dwivedi</i>	493-495
<b>47. Study of Cases of Mesial Temporal Sclerosis Diagnosed on MRI</b> <i>Maulik Jethva, Manisha Panchal, Anjana Trivedi, Manish Yadav, Anirudh Chawla</i>	496-498
<b>48. Histopathological Patterns and Cytonuclear Grade of Ductal Carcinoma in situ Occurring Concurrent with Infiltrating Ductal Carcinoma of the Breast</b> <i>Sharma Upender, Kaur Uttamjot, Puri Arun, Singh Navtej</i>	499-502
<b>49. Resin Bonded Bridges: From Crust to the Core – A Review Article</b> <i>Shraddha Ramteke, Seema Sathe, S.R. Godbole, Ankita Rawat</i>	503-506
<b>50. Analysis of Profile of Childhood Poisoning in A Tertiary Care Medical College Hospital</b> <i>Menon Narayanankutty Sunilkumar, Vadakut Krishnan Parvathy</i>	507-510
<b>51. Effect of Phenylephrine, Ephedrine and Phenylephrine Plus Ephedrine Infusions on Maternal Hypotension in Elective Caesarean Section: A Comparative Study</b> <i>Pandurang Kondiba Jadhav</i>	511-514
<b>52. Osteosarcomatous De-differentiation of Low Grade Chondrosarcoma of Mandible –A Clinical Rarity</b> <i>Alphy Alphonsa Sebastian</i>	515-517
<b>53. Infertility with Special Reference to Genital Mycoplasmas in a Medical College and Hospital Kolkata</b> <i>Swagnik Roy, Bibhas Saha Dalal, Kalpana Karak, Barun Saha Dalal</i>	518-520
<b>54. Management of Recurrent Pneumothorax and Broncho-Pleural Fistula by Closure of Infected Bullae via Flexible Bronchoscopy Guided Instillation of Silver Nitrate</b> <i>Sameer Singhal, Anand S, Alok Ranjan Singh, Abinav Dagar, Ankit Sharma</i>	521-522
<b>55. Adnexal Torsion During First Trimester of Pregnancy: A Case Report</b> <i>Deepa Shanmugam, Sabary Priyadharsini Masilamani, Ami Ajay Mehta, Anusuya Parivakkam</i>	523-524
<b>56. Superficial Dermatophytosis: A Study of Clinical Variants and Mycological Isolates</b> <i>Deena Patil, Neelima. A</i>	525-528
<b>57. Epidemiological Analysis of Maxillofacial Trauma in Patients of Road Traffic Accidents</b> <i>Gurbax Singh, Gurleen Kaur, Jai Lal Davessar, Vikas Goyal</i>	529-531
<b>58. Effect of Diode Laser on Clinical Parameters in Aggressive Periodontitis Patients - A Pilot Study</b> <i>Vijayendra Pandey, Neerav Dutta, Rohit Singh, Satyendra, C.K. Singh, Anup Kumar</i>	532-534
<b>59. Status of Sensorineural Hearing Loss in Chronic Suppurative Otitis Media Patients</b> <i>Devendra Bahadur Singh, Sunil Kumar, Hitendra Prakash Singh, S. P. Agarwal, Anupam Mishra, Veerendra Verma</i>	535-538
<b>60. Sociodemographic Profile of Patients with Conversion Disorder –A Study from Kashmir</b> <i>Mohammad Maqbool Dar, Rehana Amin, Zaid Ahmad Wani, Mohd. Altaf Paul</i>	539-541
<b>61. Clinicopathological Evaluation of Lymph Node Lesions by Fine Needle Aspiration Cytology</b> <i>Sharma Upender, Bajaj Akanksha, Bamra Navtej Singh</i>	542-545
<b>62. Comparative Study on Portobiliary Elements of Right Hemiliver Posterior Sector</b> <i>Dragica Jurkovikj</i>	546-550
<b>63. Assessment of Unmet Need for Family Planning and it's Association with Reproductive Behaviour of Women in Rural Jaipur</b> <i>Jai Prakash Pankaj, Ram Chandra Chaudhary, Anjali Jain</i>	551-554
<b>64. Self Reported Oral Health, Self Care and Dental Attendance of Pregnant Women in India: A Postnatal Survey</b> <i>Nupura A. Vibhute, Aniket H. Vibhute, Renuka L Pawar, Pramod RC, Madhura P Tengshe, Rajendra T. Daule</i>	555-558

<b>65. Role of Diffusion Weighted Imaging in Intracranial Tumors with Pathological Correlation</b> <i>J. S. Aswini Jyothi, P. Sree Hari, V. Karuna</i>	559-563
<b>66. Awareness of Basic Life Support among Dental Interns and Postgraduate Students in Davangere City- A cross Sectional Survey</b> <i>Sapna B, Nousheen N, Krithi N, Veeresh D. J</i>	564-567
<b>67. Incidence of Group B Streptococci Colonization during the Third Trimester of Pregnancy in two Tertiary Care Centers in the Central Part of Kerala</b> <i>Kundoly V Suseela, Vasanthi Jayaraj, Thomas Betsy, Fareena Jabeen, Mohan Ramya</i>	568-570
<b>68. Cadaveric Study of Higher Division of Sciatic Nerve</b> <i>Ch. Jayamma, Padmaja Vasi, Raju Sugavasi</i>	571-572
<b>69. Retrospective Study of Prevalence of Common Intestinal Parasitic Infection in Tertiary Care Centre at Kanpur</b> <i>R. Sujatha, Nidhi Pal, Deshni Singh, Suneet Yadav, D. Arunagiri</i>	573-575
<b>70. Usefulness of CECT Abdomen in the Diagnosis and Treatment of Chronic Appendicitis in Children</b> <i>Subrat Kumar Mohanty, Amaresh Mishra, Chinmaya R Behera, Sanjeet Mishra, Aparna Behura</i>	576-579
<b>71. Study of Correlation Between Microalbuminuria and Ischemic Stroke</b> <i>Goornavar SM, R Pramila Devi, HY Samrat</i>	580-584
<b>72. A Relevance of Lipid Changes in Hypothyroidism Patients Associated with and without Metabolic Syndrome</b> <i>Savita Rathore, Amita Parmar, Meena Varma</i>	585-590
<b>73. Prevalence and Risk Factors of Obstructive Sleep Apnea in Hypertensive Patients</b> <i>Easwaramangalath Venugopal Krishnakumar, Ponneduthamkuzhy Thomas James</i>	591-596
<b>74. Natural Smile Preservation - Reattachment of Fractured Maxillary Incisor - A Case Report</b> <i>Ushma Prajapati, Hitesh Sonigra, Kiran Vachhani, Kailash Attur</i>	597-599
<b>75. Spectrum of Biopsy Proven Nephropathies in A Tertiary Care Hospital in Mysuru</b> <i>Himamani. S, Suneetha. D.K, Raghavendra. B.L.</i>	600-603
<b>76. Functional Outcome of Displaced Acetabular Fractures Treated by Open Reduction and Internal Fixation</b> <i>Melvin J George, Druvan S, K.K.Chandrababu, V.K. Bhaskaran</i>	604-606
<b>77. Knowledge Practice and Attitude Regarding Tobacco use Among Interns of A Private Medical College: A Cross Sectional Study</b> <i>Aruna Yadiyal, Supriya Hegde</i>	607-609
<b>78. Outcome of Head Injury Patients Based on Computed Tomography (CT) Scan Findings in a Tertiary Care Hospital:- A Cross-sectional Study</b> <i>Chandra Sameer, Joshi H S, Joshi Gaurav, Singh Kashmir</i>	610-612
<b>79. Study of Obstetric Patients Admitted to Intensive Care Unit at Tertiary Care Centre in Western Uttar Pradesh: One Year Review</b> <i>Simeen Usmani, Roshan Perween, Shadab Alam</i>	613-615
<b>80. Comparative Evaluation of Surface Colonization of Candida on Three Different Denture Base Materials - An In Vivo Study</b> <i>Tanvi Jaiswal, A J Pakhan, S R Godbole, Seema Sathe, Shruti Bohra, Apurva Deshmukh</i>	616-620
<b>81. Benign Looking Malignant or Malignant Looking Benign? - The Final Verdict in Postmenopausal Bleeding: A Prospective Observational Study</b> <i>Sujatha BS, Sapna V Amin, Caroline, Raghavendra Rao, Ravi K Sori, Chaitan Jaunky</i>	621-623