

Oral Health Status of 300 Pregnant Women Attending Antenatal Clinics of Visahakapatnam City – One Year Descriptive Cross-Sectional Study

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ABSTRACT

Introduction: During pregnancy, the oral tissues are liable to change due to the hormonal variations that occur. A change in personal habits along with neglect of oral health might predispose to oral diseases. Study aimed to assess the oral health status of the pregnant women in Visakhapatnam, Andhra Pradesh.

Material and Methods: Stratified random sampling was done to obtain 300 pregnant women with 100 from each trimester attending the antenatal clinics of three hospitals in Visakhapatnam over a period of one year. The oral health status was evaluated with respect to oral hygiene using Oral Hygiene Index – Simplified (OHI-S), dental caries using Decayed, Missing, Filled Teeth (DMFT) index, periodontal status using Community Periodontal Index (CPI) and prosthetic status.

Results: The mean age of the study population was 22.2 years. Mean OHI-S score was 3.4 and it was found that oral hygiene worsened with the duration of pregnancy (ANOVA, $F = 29.9$) ($P < 0.05$). The mean DMFT was 1.8, and was found to be influenced by the oral hygiene status using Pearson's correlation co-efficient ($P < 0.05$). Chi-square test showed that the CPI scores increased with the trimester of pregnancy indicating worsening periodontal conditions with duration ($P < 0.001$). Majority (49.7%) of the study population required restorative care, 14.4% were in need of complex periodontal care and 7.4% needed prosthesis.

Conclusion: The findings of the study demonstrate low caries experience, poor oral hygiene and poorer periodontal status with progressing pregnancy.

Keywords: Dental Caries, Oral Hygiene, Periodontal Health, Pregnancy, Prosthetic Status

Firstly, the effect of female sex hormones on the gingival tissues is remarkable. Estrogens regulate cellular proliferation, differentiation and keratinization. Increased levels of progesterone cause changes in gingival microvasculature.^{1,2,3} Secondly, the composition of sub-gingival plaque is changed with an increase in micro-organisms such as *Prevotella intermedia* and *B. melaninogenicus*.^{4,5} In addition, the changes in the immune-responsiveness during pregnancy also contribute to increased susceptibility to develop gingivitis,^{6,7} as maternal immune response is suppressed so that, this response may allow the fetus to survive as an allograft.⁵

The pregnant women because of decreased stomach capacity during the third trimester are inclined to eat smaller amounts frequently. This constant snacking habit may be highly cariogenic. In addition, the morning sickness and frequent vomiting among most of them that accompany the first trimester result in exposure of enamel to gastric acid.⁸ Recently, dentistry has focused on the potential associations between dental health and its contributory influence on general health during pregnancy such as, periodontitis as risk factor for pre-term low birth weight.^{9,10} Also, strategies for preventing *S. Mutans* transmission from mother to child and thereby discouraging development of early childhood caries has gained importance.^{11,12} During pregnancy, a woman is particularly amenable to disease prevention and health promotion as she is at 'a teachable moment' in her life, as she wants her baby to be healthy. Thus, there is a need for a dentist who plays a vital role in imparting dental health education where, education programs for expectant mothers could result in children being taught routine behaviors beneficial to dental health.

Previous epidemiological literature has emphasized on the changes in the gingival and periodontal tissues during

INTRODUCTION

Since the old wives' tale of "the loss of a tooth for every pregnancy", oral health during pregnancy has long been a focus of interest. Relatively few epidemiological endeavors have however, studied the implications of the various physiologic changes that take place during this period of nine months. The oral changes occurring during this period are the result of the effect of the hormones and the increase in the need of appropriate oral hygiene instructions and health care.

It has been suggested that gingival changes observed during pregnancy reflect a physiological state, comparable to gestational changes occurring in vaginal and other mucosal tissues,¹ while another proposition is the interplay of various factors that contribute to development of gingivitis during pregnancy.

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pregnancy.^{8,13-16} But, very few studies have however recorded the overall oral health status including dental caries experience of the pregnant women. Hence, this study was undertaken to gather an estimate of the prevalence of oral diseases among pregnant women and their treatment needs.

MATERIAL AND METHODS

The present descriptive, cross-sectional study was conducted to evaluate the oral health status of the pregnant women attending for antenatal check up at the three main Obstetrics hospitals of the city i.e. (Approximately 100 from each hospital). The hospitals were selected randomly by draw and the number was limited to three to permit convenience in collection of data. One of the hospital was from the private sector while the other two were from the public sector.

A sample consisting of 300 pregnant women, 100 from each trimester of pregnancy were included in the study. This study was conducted over a period of one year. Stratified random sampling technique was used to obtain a sample of 300 pregnant women, 100 subjects were selected randomly in each trimester from these hospitals. The study was conducted on every alternate Monday for 26 weeks. Twice a month schedule was adopted to ensure that different women would be present for the examination.

Inclusion Criteria

- Patients who were asymptomatic with respect to dental diseases.
- Patients who were cooperative and were willing to participate.
- Patients who could comprehend the need for the study.

Exclusion Criteria

- Patients with acute disease presentation such as gingival overgrowth, spontaneous bleeding.
- History of systemic illnesses including infective endocarditis, hepatitis B infection, diabetes mellitus (Including Gestational).
- Patients on medications predisposing to gingival overgrowth.

Before commencement of the study, ethical clearance was obtained from the Institutional Review Board of the college and official permission was obtained from the administrative in-charges of the above three hospitals to carry out the study. Prior informed consent was obtained from the subjects who participated in the study.

Pilot Study

Pilot study was conducted in the presence of an instructor on 30 pregnant women to assess the oral health status of this special group and to know the feasibility of the study. Proforma was specially designed for recording the details of each subject. Any difficulties encountered were overcome by redesigning the proforma. These 30 patients were not included in the study.

Intra-examiner consistency was assessed by re-examining 10% of the subjects after completion of the cases. The agreement between the first and second examination was 90%.

The modified proforma used in the present study consisted of two parts: the first part pertaining to the questions that included demographic information (Age, Place of residence, Employment Status and Trimester of pregnancy) which was retrieved from clinical records and also through interviews with the patient (Oral hygiene practices, regularity of cleaning the teeth i.e. cleaning at least once per day and aids used to clean teeth). The second part consisted of information recorded on clinical examination.

Examination Procedure

Examination was done with the help of diagnostic instruments in a separate room with adequate illumination and artificial light. The number of teeth present was recorded according to WHO 1997 criteria.¹⁷

Dental caries was recorded using Decayed, Missing and Filled Teeth (DMFT), and Decayed, Missing and Filled Surfaces (DMFS) indices.¹⁸ Oral hygiene status was recorded using Simplified Oral Hygiene Index (OHI-S)¹⁹ and periodontal status by Community Periodontal Index (CPI).¹⁷ The prosthetic status and treatment needs was recorded according to the WHO Oral Health Assessment Form (1997).¹⁷ The treatment needs of these pregnant women were based on the clinical findings recorded and local facilities available for treatment of such patients.

Oral health education for the patients

After the interview and examination was completed, oral health education was provided to the patients individually regarding brushing technique, how to keep effectively keep their mouth clean with the aid of health education models and charts. Emphasis on importance of routine, simple preventive measures and periodic dental visits were given. Free samples of tooth brushes and toothpastes were also distributed to the patients.

STATISTICAL ANALYSIS

All the collected data was entered systematically into MS excel sheet and analyzed using SPSS (Version 16, 2015). *P*-value was set at < 0.05 to be statistically significant.

1. Analysis of Variance (ANOVA) was used in the present study to:
 - Assess significant difference of oral hygiene status across three trimesters
 - Assess significant difference of caries status across three trimesters
2. Chi square test was used to associate pregnancy across three trimesters with periodontal status.
3. Pearson's Correlation Coefficient was used to assess relationship between oral hygiene status and dental caries among pregnant women in the present study.

RESULTS

A total of 300 pregnant women, 100 from each trimester were included in the study. The age ranged from 16-36 years, with the mean age of 22.2 ± 3.2 years. This study was conducted over a period of one year.

Most (99.4%) of the pregnant women in the present study were unemployed and 51.4% belonged to urban area (Table

Trimesters	Occupation		Place of residence	
	Employed n (%)	Unemployed n (%)	Rural n (%)	Urban n (%)
1 st Trimester	1 (0.3)	99 (33)	43 (14.3)	57 (19)
2 nd Trimester	1 (0.3)	99 (33)	49 (16.3)	51 (17)
3 rd Trimester	0	100 (33.4)	54 (18)	46 (15.4)
Total	2 (0.6)	298 (99.4)	146 (48.6)	154 (51.4)

Table-1: Distribution of the study population with regard to occupation and location of residence

Trimesters	Regularity of cleaning the teeth n (%)	Oral hygiene aids used		
		Toothbrush with dentifrice n (%)	Finger with dentifrice n (%)	Tooth powder n (%)
1 st Trimester	97 (32.4)	67 (22.3)	29 (9.7)	4 (1.4)
2 nd Trimester	99 (33)	63 (21)	34 (11.3)	3 (1)
3 rd Trimester	99 (3)	58 (19.3)	39 (13)	3 (1)
Total	295 (98.4)	188 (62.6)	102 (34)	10 (3.4)

Table-2: Distribution of the study population with respect to oral hygiene practices and aids used to clean the teeth

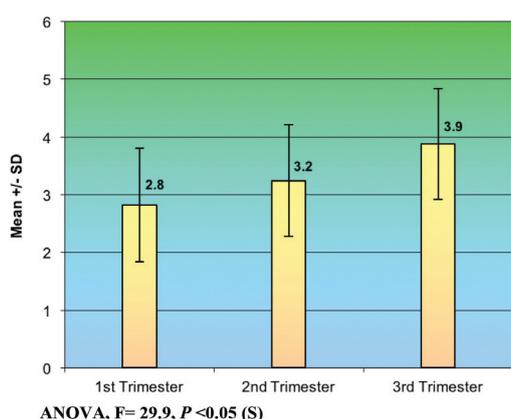
Trimesters	Percentage of persons coded with CPI						Percentage of persons coded with Loss of attachment (LA)					
	0	1	2	3	4	X and 9	0	1	2	3	4	X and 9
1 st Trimester	-	5	57	34	4	-	96	4	-	-	-	-
2 nd Trimester	2	-	38	58	2	-	98	2	-	-	-	-
3 rd Trimester	-	-	23	40	37	-	63	18	10	9	-	-
Total	0.6	1.7	39.3	44	14.4	-	85.7	8	3.3	3	-	-

Chi-square = 81.2, P < 0.001 (HS)

Table-3: Periodontal Status among pregnant women according to trimesters

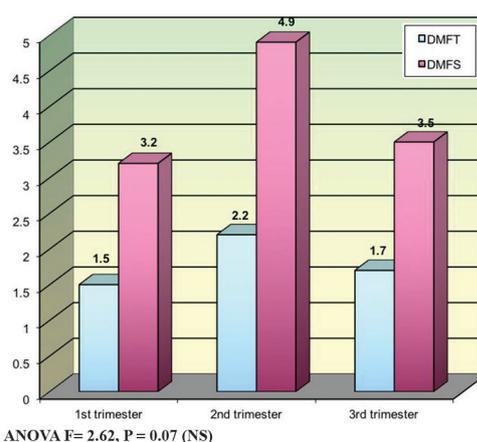
Trimesters	Prosthetic Status FPD n (%)	Prosthetic Needs n (%)				Overall Prosthetic Need
		No Prosthesis	Need for RPD	Need for FPD	Need for CD	
1 st Trimester	1 (0.5)	95 (31.6)	-	5 (1.7)	-	5 (1.7)
2 nd Trimester	2 (0.6)	90 (30)	4 (1.4)	6 (2)	-	10 (3.4)
3 rd Trimester	-	93 (31)	1 (0.3)	6 (2)	-	7 (2.3)
Total	3 (1)	278 (92.6)	5 (1.7)	17 (5.7)	-	22 (7.4)

Table-4: Prosthetic Status and needs of the pregnant women according to trimesters



Graph-1: OHI-S scores of pregnant women in various trimesters

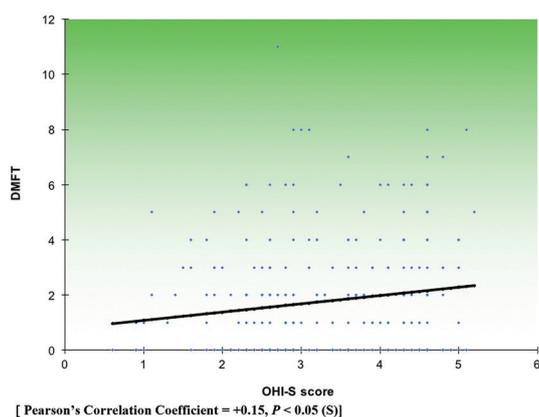
I). Majority (98.4%) of the study population cleaned their teeth at least once per day and most (62.6%) used tooth brush and dentifrice to maintain oral hygiene. The use of toothbrush decreased progressively with the trimesters (Table II). The mean OHI-S score of the study population was 3.4 ± 1 . The oral hygiene status of the study population showed



ANOVA F= 2.62, P = 0.07 (NS)

Graph-2: Caries prevalence among the study population

continuous decline with each trimester and was found to be statistically significant [P < 0.05 (s)] (Graph I). Table III depicts the periodontal status measured by CPI among pregnant women that is presented as percentage of persons and the mean number of sextants affected. While



Graph-3: Relationship between OHI-S status and DMFT among the pregnant women

most of them (44%) scored for presence of shallow pockets, on the sextant basis most common condition was the presence of bleeding on probing. Healthy gingiva was seen in only 0.6% of the study population. Very few participants (14.3%) in the present study had loss of attachment and was seen only among third trimester pregnant women. The periodontal disease was observed to worsen from first trimester to third trimester, and was found to be statistically significant [$\chi^2 = 81.2$, $P < 0.001$ (S)]

The mean DMFT and DMFS scores were 1.8 ± 2.1 and 3.9 ± 5.9 respectively. The DMFT and DMFS scores were found to be highest in second trimester (2.2 and 4.9 respectively). However, there was no statistically significant difference of caries status across the trimesters. (Graph II) The overall prevalence of dental caries was found to be 56.3%, with 4% having restorations.

The caries experience was found to increase with the worsening of the oral hygiene status and was found to be significant. [Pearson's Correlation Coefficient = +0.15, $P < 0.05$ (S)] (Graph III) The periodontal disease also was found to deteriorate with poorer oral hygiene status. $\chi^2 = 262.8$, $P < 0.001$ (S)

Only 1% had fixed partial prosthesis that was in the form of crown and bridge, there were no removable partial dentures. There were no edentulous subjects and 92.6% did not require any prosthesis. (Table IV)

Regarding the treatment needs of the pregnant women, the overall caries free population was 45%, while 49.7% required restorative care with the highest (19.4%) need seen in the second trimester. Only 5.7% needed extraction of untreatable carious teeth. The need for prosthesis was observed in 7.4%. Among the periodontal care required, only 14.3% were in need of complex periodontal care.

DISCUSSION

Numerous physiologic variations are experienced during pregnancies that are caused due to the influence of the hormones. These hormonal variations are known to affect the oral structures mainly the gingival and periodontal tissues. Most pregnant women also tend to neglect their oral hygiene and hence are susceptible to oral diseases. Frequent snacking

and vomiting experienced by most of them is known to cause demineralization of enamel.

Various studies conducted^{13,14,15} depict that pregnant women present with gingival inflammation and periodontal changes, and hence emphasize for the presence of dentist in the antenatal team in order to provide oral health education that is essential for these women that are similar to the results of the present study.

98.4% of the pregnant women in the present study cleaned their teeth daily that is comparable to the previous studies.^{20,21,22}

The mean OHI-S score reported by Arafat AH¹³ in Baltimore, Amin R et al²³ in Mangalore and Asha Samant, Malik CP et al¹⁴ in Chandigarh were 1.006, 1.03 and 1.46 respectively, that indicates a better oral hygiene status in comparison to our study population where the score was 3.4 ± 1 . However, similar oral hygiene scores were found in the study conducted by Agbelusi GA et al.²⁴ Also, in the present study, oral hygiene index scores were found to increase progressively with the trimesters ($P < 0.05$, S), which is probably the result of less importance that is given to oral health with progression of pregnancy. This finding was supported by the observations of Arafat AH¹³ in Baltimore, Asha Samant et al¹⁴ in India and Agbelusi GA et al²⁴ in Africa. But Cohen WD et al⁸ in their study conducted in Philadelphia found only an increase in hard irritants (Calculus) with the trimester. Another study conducted by Amin R et al²³ that compared oral hygiene between pregnant and non-pregnant women found significantly poorer oral hygiene among pregnant women.

The low dental caries prevalence reported in our study might be due to the complex process involved in the development of carious lesion that necessitates the interaction of required factors over a prolonged period of time, which could not be accommodated within the duration of this study. But this low caries finding is consistent with the study conducted in Nigeria by Agbelusi GA et al²⁴ where the DMFT status was reported to be 1.54.

The analysis of the component parts of the mean DMFT of our study demonstrates that the mean number of decayed teeth (1.6) was in excess in comparison to the missing teeth (0.1) and filled teeth (0.1). This finding is in sharp contrast to the other studies conducted to determine the caries experience of the pregnant women where, filled teeth component clearly is predominant than decayed and missing teeth (Jago JD et al¹⁵ and Mittas E et al¹⁶). This depicts lower utilization of dental services and large portion of unmet dental needs in our study population. But it is similar to the study undertaken in Mangalore by Amin R et al²³ where pregnant women showed DMF values of 1.3, 1.2 and 0.8 respectively.

Using Pearson's correlation coefficient, a significant association was observed between the oral hygiene status of the pregnant women and the caries experience. It was observed that subjects with poorer oral hygiene had a greater caries experience ($P < 0.05$) which does not agree with the findings of the study by Scheutz F et al²⁵.

Prevalence of periodontitis was higher in our study with only 0.6% of the pregnant women free of gingival bleeding.

This is similar to the findings of a study undertaken in Brazil by Bresane LB et al²⁶ and Rahman M et al²² in Dhaka. This increased prevalence may be caused by the poorer oral hygiene status (OHI-S = 3.4 ± 1) that may have aggravated the influence of the hormones on the periodontium.^{5,27} Also, since 98.4% of the study population were unemployed, gingival and periodontal health might have been influenced by the poorer utilization of the dental facilities available and lack of knowledge and awareness about the competent practice of oral hygiene measures. This finding is comparable to another study in India conducted by Asha Samant et al¹⁴ where, the entire study population portrayed some degree of mild or severe periodontitis and there were no subjects with clinically healthy periodontium.

The study population also depicted progressive worsening of the periodontium with trimesters of pregnancy that was found to be statistically significant ($P < 0.001$, HS) and with higher oral hygiene scores ($P < 0.001$, HS) suggesting that as a result of dental plaque accumulation, gingival inflammation develops superimposed on pregnancy associated physiologic alterations.

Pregnant women were found to have a very low prosthetic status with only 1% possessing fixed partial denture. This may be because of the low caries experience depicted by DMFT value of 1.8 in our study population. The treatment needs were also low comparatively with extraction of un-restorable teeth (Root stumps and grossly destructed teeth) indicated in only 5.7%. Hence, the prosthetic needs were also found to be low in our study with only 7.3% requiring replacement of missing teeth with partial dentures and none had need for complete dentures. This finding is supported by Jago JD et al¹⁵ in Australia who observed a prosthetic requirement of 5%.

The study has its limitations, the same sample of 100 pregnant were not followed up till the end of third trimester, as the main objective of our study was to assess the oral health status and not to track the progression of oral disease through pregnancy. Also, a lack of a control group of non-pregnant women weakens the overall generalizability of our study.

CONCLUSION

A very low utilization of dental services is usually seen among pregnant women as oral health is given little importance in contrast to impending motherhood. Also, access to dental care during pregnancy is impeded in part, by limited window of opportunity for treatment in order to avoid risk of complications. This is because elective dental treatment is avoided during the first and last half of third trimester. During the first trimester, risk of birth defects associated with the use of teratogens and chances of spontaneous abortions is greater. During the third trimester, the increased sensitivity of the uterus to external stimuli increases the risks associated with premature delivery. Thus, provision of dental treatment during pregnancy is limited to the second trimester or is postponed till the birth of the child. The population often poorly interprets these concepts and fear of dental treatment

during pregnancy and hence keeps most of the pregnant women to stay away from dentists.

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