

# 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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