

A study of determinants of sensorineural hearing loss in chronic middle ear diseases at tertiary health care centre

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Abstract

Background: Chronic middle ear diseases are common in all age groups. CSOM is chronic infection of middle ear cleft. It includes Eustachian tube, middle ear and mastoid. Hearing loss in CSOM is more conductive but some studies found sensorineural hearing loss in CSOM. This study aimed at finding determinants of sensorineural hearing loss in chronic middle ear disease. **Aim and objective:** To study the determinants of sensorineural hearing loss in chronic middle ear diseases at tertiary health care centre. **Methodology:** Present study was conducted in department of ENT in ANNMCH Gaya Bihar. Total 200 patients were studied with selection criteria. Data was collected using pretested questionnaire. It included sociodemographic data, detailed history and clinical examination of patients. Pure tone audiometry was performed by a calibrated audiometer. Patients were analysed on the basis of duration of disease, presence or absence of otorrhea, site of perforation, presence or absence of cholesteatoma at different test frequencies. **Results and discussion:** Mean age of the patient was 26.34±3.6 years. Majority of the patients were in the age group of 11-20 years (36%) followed by 21-30 years (29%). Males predominate females but this difference was statistically not significant. Majority of the patients were in duration of disease of 2-5 years (34%) followed by duration less than 1 year (28%). We found greater difference in the high frequencies than lower frequencies. No significant difference was found between ears with or without cholesteatoma across all frequencies ($p > 0.05$). No significant difference was found between ears with or without erosion across all frequencies ($p > 0.05$).

Key Word: sensorineural hearing loss.

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exposure to loud noise, congenital deformities, inner ear infections and trauma to head. It has been suggested that toxins in CSOM can damage cochlea so in addition to the conductive hearing loss (CHL), SNHL may occur as a result of CSOM¹. Hearing loss is a public health problem in developed and developing countries. Hearing loss causes impaired language development and speech skills in children and poorer life quality and psychological problems for adults^{2,3}, so this study is aimed at finding the determinants of sensorineural hearing loss in chronic middle ear diseases at a tertiary health care centre.

INTRODUCTION

Sensorineural hearing loss is caused by dysfunction of the inner ear, the cochlea, auditory nerve, or brain damage. This type of hearing loss is due to damaged hair cells in cochlea. As age advances hair cells lose some of their function and hearing worsens. Other causes are long term

AIM AND OBJECTIVE

To study the determinants of sensorineural hearing loss in chronic middle ear diseases at tertiary health care centre

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MATERIAL AND METHOD

Present study was conducted in department of ENT in ANNMCH Gaya Bihar. Total 200 patients were studied with following

Inclusion criteria:

1. Unilateral chronic suppurative otitis media
2. No history of head injury or previous ear surgery

Exclusion criteria:

1. Patients with history of meningitis and systemic disease affecting hearing
2. Patients not willing to participate

Present study was approved by ethical committee of the institute. A valid written consent was taken from patients after explaining study to them. Data was collected using pretested questionnaire. It included sociodemographic data, detailed history and clinical examination of patients. Pure tone audiometry was performed by a calibrated audiometer. Patients were analysed on the basis of duration of disease, presence or absence of otorrhea, site of perforation, presence or absence of cholesteatoma at different test frequencies. Data was analysed with appropriate statistical tests.

RESULTS

Total 200 patients were studied. Mean age of the patient was 26.34 ± 3.6 years. Majority of the patients were in the age group of 11-20 years (36%) followed by 21-30 years (29%). Patients were less in extremes of age i.e. only one patient was found above 60 years and 6% were found

below 10 years. Figure 1 shows gender distribution of the patients. Among all 200 patients 112 (56%) were male and 88 (44%) were females. Thus males predominate females but this difference was statistically not significant. Out of all patients right ear 98 (49%) was infected less than left ear 102 (51%). This difference was statistically not significant. We enquired about duration of disease. Majority of the patients were in duration of disease of 2-5 years (34%) followed by duration less than 1 year (28%). Only 25% of the patients were with dry ear remaining 75% were with wet ear. Cholesteatoma was present in 49% of the patients. It was absent in 51% of the patients. Ossicular chain was intact in 102(51%) patients and eroded in 94 (47%) patients. It was unknown in 4 (2%) patients. Table 2 shows distribution of patients according to site and size of perforation. Majority of the patients were having attic perforation 80 (40%) followed by central medium 40 (20%) and central large perforation 40 (20%). Table 3 shows mean BC threshold differences between the affected and normal ears. Affected ear had more bone conduction threshold than normal ear. this difference was statistically significant (p value <0.05). Table 4 shows mean BC threshold differences between the affected and normal ears based on the presence of cholesteatoma. No significant difference was found between ears with or without cholesteatoma across all frequencies ($p > 0.05$). Table 4 shows mean BC threshold differences between the affected and normal ears based on the presence of ossicular erosion. No significant difference was found between ears with or without erosion across all frequencies ($p > 0.05$).

Table 1: Distribution of patients according to age group

Sr no	Age group (years)	No of patients	Percentage
1	0-10	12	6%
2	11-20	72	36%
3	21-30	58	29%
4	31-40	36	18%
5	41-50	16	8%
6	51-60	04	2%
7	>60	02	1%

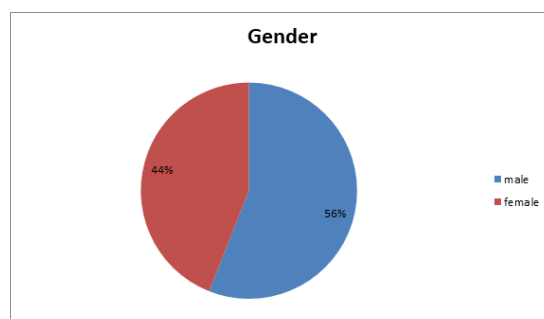


Figure 1: Distribution of patients according to gender

Table 2: distribution of patients according to site and size of perforation

Sr no	Site and size of perforation	No of patients	Percentage
1	Attic	80	40
2	Central –small	20	10
3	Central – medium	40	20
4	Central – large	40	20
5	Subtotal	20	10

Table 3: Mean BC threshold differences between ears based on presence of affected ear

Frequency	Bone conduction threshold		P value
	Affected ear	Normal ear	
500	17.41± 11.25	10.41± 8.16	<0.05
1000	18.12±15.12	11.23±7.14	<0.05
2000	20.9±14.3	14.13±10.11	<0.05
4000	27.52±19.16	19.12±12.55	<0.05

Table 4: Mean BC threshold differences between ears based on presence of cholesteatoma

Frequency	Bone conduction threshold		P value
	Without cholesteatoma	With cholesteatoma	
500	7.16± 2.31	5.28± 2.26	>0.05
1000	8.37±2.15	5.13±2.43	>0.05
2000	9.16±1.92	6.83±2.17	>0.05
4000	10.26±2.14	6.14±1.93	>0.05

Table 5: Mean BC threshold differences between ears based on presence of erosion

Frequency	Bone conduction threshold		P value
	Without erosion	With erosion	
500	7.41± 1.35	5.33± 1.24	>0.05
1000	7.83±1.93	5.17±1.59	>0.05
2000	8.17±2.13	7.39±1.86	>0.05
4000	10.41±1.99	6.71±1.95	>0.05

DISCUSSION

Mean age of the patient was 26.34±3.6 years. Majority of the patients were in the age group of 11-20 years (36%) followed by 21-30 years (29%). Males predominate females but this difference was statistically not significant. Majority of the patients were in duration of disease of 2-5 years (34%) followed by duration less than 1 year (28%). Only 25% of the patients were with dry ear remaining 75% were with wet ear. Similar findings were observed in a study by Nanda *et al*⁴ where incidence of sensorineural hearing loss was observed to increase with age of the patient and duration of disease. In a study by Kholmatov *et al*⁵ Higher incidence was observed with duration of disease. Cholestatoma was present in 49% of the patients. Ossicular chain was intact in 102(51%) patients and eroded in 94 (47%) patients. In our study. Affected ear had more bone conduction threshold than normal ear. this difference was statistically significant (p value <0.05). we found greater difference in the high frequencies than lower frequencies. Similar findings were observed in study by Noordzij *et al*¹ and Mac Andie and O'Reilly *et al*⁶. similarly, higher frequencies showed greater difference in a study by Levine *et al*⁷ Middle ear infection change the

permeability of round window membrane and remanants of bacteria like endotoxins pass through membrane and damage inner ear specially in high frequency region located near round window. Table 4 shows mean BC threshold differences between the affected and normal ears based on the presence of cholesteatoma. No significant difference was found between ears with or without cholesteatoma across all frequencies (p > 0.05). Table 5 shows mean BC threshold differences between the affected and normal ears based on the presence of ossicular erosion. No significant difference was found between ears with or without erosion across all frequencies (p > 0.05). In our study strongly significant correlation was observed between patients' age and the degree of SNHL (p < 0.001). similar findings were found in Redaelli *et al*.⁸ and Vartiainen⁹ Kolo *et al*.¹⁰ found a significant degree of SNHL in patients with CSOM, but the patient's age and duration of otorrhea did not have any correlation with it. Raqib¹¹ and Kaur¹² observed a significant relationship between SNHL and the disease duration.

CONCLUSION

SNHL associated with affected ear and found more with higher frequencies, age of the patient and duration of the disease.

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