



ORIGINAL RESEARCH PAPER

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ANALYSIS OF SENSORINEURAL HEARING LOSS IN CHRONIC SUPPURATIVE OTITIS MEDIA

KEY WORDS:

Dr. Sudhanshu Sekhar Sahoo*

Junior Resident ,Hi-Tech medical college, Bhubaneswar)*Corresponding Author*

Dr. Rajlaxmi Panigrahi

Professor and HOD Hi-Tech medical college, Bhubaneswar

Dr. Sudipta Rout

Junior Resident ,Hi-Tech medical college, Bhubaneswar

Dr. Eliza Priyadarsini Behera

Junior Resident, Hi-Tech medical college, Bhubaneswar

ABSTRACT

Aim of study: To explore the association between chronic otitis media and sensorineural hearing loss and to correlate between age of patients & duration of disease on the development of sensorineural hearing loss. **Study design:** Cross sectional study. Sample size: 100 Study Period: July 2021 – July 2022 **Methods:** A detailed history will be taken in all patients and then ENT examination will be carried out to determine the type of COM present. Pure Tone Audiometry will be done to assess for hearing deficit and type of loss. The hearing of the patient would be assessed by pure tone audiogram. Hearing loss upto 20 dB will be considered normal, 21-40 dB mild, 40-55 dB moderate, 55-70 dB moderately severe, 70-90 dB severe, and above 90 as profound. Categorical data will then be analyzed by chi-square test, to correlate the clinical analysis with respect to age of patient, duration of disease and the type of COM on the development of sensorineural hearing loss. **Inclusion Criteria:** History of recurrent otorrhoea occurring within 5 years of the time of data of collection. **Exclusion Criteria:** Patients in whom hearing loss can be attributed to reasons other than chronic otitis media Eg. Following traumatic perforation, history of long term intake of systemic ototoxic drugs, previous ear surgery, meningitis, enteric fever, head injury, diabetes mellitus, familial hearing loss, labyrinthitis, labyrinthine fistula are to be excluded from the study. Patients below the age of 15 years have been excluded due difficulty in obtaining an accurate audiological profile and those above the age of 60 years are not selected so as to exclude the possible effects of aging process. Patients not giving consent for the study. Potential Risks of Study: Nil **CONCLUSION :** From this study it can be concluded that the earlier theoretical knowledge on Chronic Otitis Media causes conductive hearing loss cannot be applied universally. In our study, it is mixed hearing loss which is in higher prevalence than the pure conductive variety in the study population suggestive of the sensorineural contribution. However much more clear idea on type of hearing loss in COM can be documented with further studies involving larger population.

INTRODUCTION

Chronic middle ear disease especially chronic otitis media (COM) is a major public health problem in developing countries. The previously termed chronic suppurative otitis media (CSOM) has been replaced by the term chronic otitis media (COM) on account of latest research suggesting that infection, although common is not a consistent enough feature of the condition. It usually leads to a significant hearing impairment, sensorineural hearing loss being one of them. An estimated 67% of the world's hearing impaired population is within the developing countries. There exists a significant difference in the prevalence rate for ear disease is evident between developed countries and developing countries. Some of the reasons for this disparity are over-crowding, suboptimal hygiene, malnutrition, ignorance, passive smoking, high nasopharyngeal colonization with bacteria, inadequate access to required healthcare. A true estimate of the problem of deafness is not known in India. Various workers and organizations have reported prevalence of hearing impairment in about 10% of rural and 6.8% of urban populations. A survey conducted by Indian Council of Medical Research has reported that the major etiological factor responsible for hearing loss in rural areas is chronic otitis media (42.4%). In urban areas it is responsible for 23.1% of all cases of deafness. Chronic otitis media is a chronic infection of middle ear cleft characterized by tympanic membrane perforation and inflamed middle ear lining mucosa. It is well known entity prevalent worldwide.

AIM OF STUDY

To explore the association between chronic otitis media and sensorineural hearing loss.

To correlate between age of patient, duration of disease and the type of COM on the development of sensorineural hearing loss.

REVIEW OF LITERATURE

Global burden of Chronic Otitis Media and regional prevalence-Chronic otitis media (COM) is a significant cause of hearing loss, especially in the developing world¹⁴. As the name suggests, it is a long standing disease with a host of complications and sequelae; each of which can have permanent, long standing effects on communication, language development, cognitive and psychosocial development, educational performance and achievement, particularly in children¹⁵. Prevalence studies of COM show considerable inter-study variation. This is probably because of variations in definition, statistical sampling methods, underreporting of cases and large lacunae in available data from a number of geographical areas and age groups. Prevalence surveys done by the WHO, report the overall global burden of disease from COM to be about 65-330 million people, 60% of who suffer from significant hearing impairment. In addition, COM accounts for about 28, 000 deaths, mainly attributable to brain abscess and meningitis. Over 90% of the cases of COM are seen in the countries of the South-east Asia and Western Pacific regions, Africa and regions of the Pacific Rim. It is uncommon in the Americas, Europe, the Middle East and Australia. Though there are reports of a high prevalence of COM in Aboriginal- Australian children. A survey of ear, nose and throat disorders done in Rural India, shows a 4.31% prevalence of ENT disorders, 36.6% of whom had ear problems; the most common diagnosis among these patients being COM.¹⁶ As regards the

age distribution of COM, it is predominantly a disease of childhood. Studies from a tertiary hospital in Kolkata show that 31.2% of COM cases were from the pediatric age group. Most of the patients with COM fall into the 0-10 year bracket. Probably as a result of this, COM studies have been predominantly conducted on a pediatric population. In South India, the prevalence of COM among children was found to be 6%. A similar figure (5%) is reported among children in Nepal.

At the other end of the age spectrum, COM seems also to be the most common ENT disease among the geriatric population. Okoye et al, in their study on otolaryngological disease in the geriatric population (above 60 years) reported a 55.2% prevalence of ear disease, COM being the most common diagnosis.

The direct and indirect costs related to the disease, drugs and their adverse effects and the hearing impairment constitutes a significant burden to the individual and the society. In a study done in Nigeria the cost of treating COM per patient per year was more than the national monthly minimum wage. To the best of our knowledge, there have been no studies on the Epidemiology, clinical profile or hearing loss patterns caused by COM, from Southern India on the population group between 18-60 years an age group that forms the bulk of the economically productive group of any society.

MATERIALS & METHODS

Study design: Cross sectional study.

Study site: Outpatient and Admission cases within the department of ENT, HMCH, BHUBANESWAR

Sample size: 100

Study Period: July 2021 – July 2022

Methods:

- Patients with COM will be selected consecutively as and when they present during the study period based on inclusion and exclusion criteria.
- A detailed history will be taken in all patients and then ENT examination will be carried out to determine the type of COM present. Pure Tone Audiometry will be done to assess for hearing deficit and type of loss.
- The hearing of the patient would be assessed by pure tone audiogram. Hearing loss upto 20 dB will be considered normal, 21-40 dB mild, 40-55 dB moderate, 55-70 dB moderately severe, 70-90 dB severe, and above 90 as profound.
- Categorical data will then be analyzed by chi-square test, to correlate the clinical analysis with respect to age of patient, duration of disease and the type of COM on the development of sensorineural hearing loss.

Inclusion Criteria:

History of recurrent otorrhoea occurring within 2 years of the time of data of collection.

Exclusion Criteria:

Patients in whom hearing loss can be attributed to reasons other than chronic otitis media Eg: Following traumatic perforation, history of long term intake of systemic ototoxic drugs, previous ear surgery, meningitis, enteric fever, head injury, diabetes mellitus, familial hearing loss, labyrinthitis, labyrinthine fistula are to be excluded from the study. Patients below the age of 15 years have been excluded due difficulty in obtaining an accurate audiological profile and those above the age of 60 years are not selected so as to exclude the possible effects of aging process.

- Patients not giving consent for the study.

Data Analysis:

Data collected were entered in Excel Spread sheet and

analyzed using STATA statistical software package release 11. I have used the two-sided independent-samples to test and compare means across dichotomous variables (i.e. men v. women); the one-way ANOVA test for comparison of means across categorical data. Qualitative data were given in frequencies with their percentages and quantitative data presented with, Proportions, Mean and standard deviation. Pearson's Correlation analysis was performed to assess the correlation between variables. A type I error of 0.05 was considered in all analyses.

RESULTS

Mean Age of the Study Population

	N	Mean	Std. Dev.
Age	100	37.08	11.56

The above table shows that the mean age of the study population is 37 years

Table 2: Gender wise distribution of Age in the Study Population

Variable	N	Mean	Std. Dev.
Women	43	35.86	10.28
Men	57	38.00	12.46
Total	100	37.08	11.56

P Value > 0.05

The above table shows that the male female gender distribution is 57% and 43% respectively. And the mean age of women is 36 years and that of men is 38 years.

Table 3: Gender wise distribution in the Study Population

Gender	N	Percent
Female	43	43
Male	57	57
Total	100	100

The above table shows that the male female gender distribution is 57% and 43% respectively.

Table 4: Distribution of type of Hearing loss in the Study Population

	Total		Women		Men	
Type	N	Percent	N	Percent	N	Percent
BC	24	24	9	20.93	15	26.32
BM	18	18	7	12.28	11	19.3
LC	5	5	2	4.65	3	5.26
LM	8	8	4	9.3	4	7.02
RC	19	19	8	18.6	11	19.3
RCLM	3	3	2	4.65	1	1.75
RCLS	2	2	0	0	2	3.51
RM	8	8	3	6.98	5	8.77
RMLC	2	2	2	4.65	0	0
RMLS	1	1	0	0	1	1.75
RSLC	4	4	1	2.33	3	5.26
RSLM	6	6	5	11.63	1	1.75
Total	100	100	43	100	57	100

Above table shows the distribution of different types of Hearing loss in the study population.

Key: BC-Bilateral Conductive, BM-Bilateral Mixed, LC-Left Conductive, LM-Left Mixed, RC- Right Conductive, RM-Right Mixed, RCLM-Right Conductive Left Mixed, RCLS Right Conductive Left Sensorineural, RMLC- Right Mixed Left Conductive, RSLC- Right Sensorineural Left Conductive & RSLM - Right Sensorineural Left Mixed

Key: In the previous table the alphabets represents the following, B – Bilateral
R – Right L – Left
C – Conductive S – Sensorineural M – Mixed

Chart 3: Distribution of type of Hearing loss in the Study Population

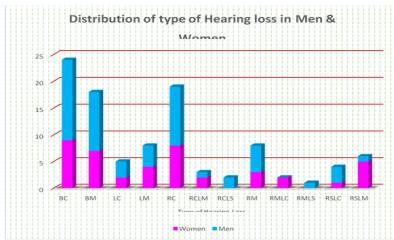


Table 6: Mean Age according of type of Hearing loss in the Study Population

Age	N	Mean	Std. Dev.
Conductive	48	35.40	10.72
Others	52	38.63	12.19

PValue >0.05

The above table shows that the mean age of those with conductive type of hearing loss is 35 years and that of other varieties is 39 years.

The above table shows that there is no statistical difference in mean age between the two categories of hearing loss in the study population.

Table 7: Duration of discharge according of type of Hearing loss in the Study Population

Duration of Discharge	N	Mean	Std.Dev.
Conductive	48	6.23	6.92
Others	52	7.61	7.09
Total	100	6.92	

PValue > 0.05

The above table shows that the mean duration of ear discharge of those with conductive type of hearing loss is 6 years and that of other mixed type is 8 years.

The above table shows that there is no statistical difference in mean duration of discharge between the two categories of hearing loss in the study population

Table 8: Audiogram findings according of type of Hearing loss in the Study Population

	Conductive		Others		P Value
	Mean	SD	Mean	SD	
Right	30.09	12.17	44.37	22.72	<0.01
Left	25.39	10.58	46.81	21.98	<0.01

The above table shows that the mean audiogram findings were 30.09db and 25.39db in right and left ears respectively in those with conductive type of hearing loss. And 44.37db and 46.81db in right and left ears respectively in those with other varieties of hearing loss.

The above table shows that there is a significant statistical difference in mean audiogram values between the two categories of hearing loss in both right and left ear respectively in the study population.

Table 9: Audiogram findings according of type of Hearing loss in the Study Population

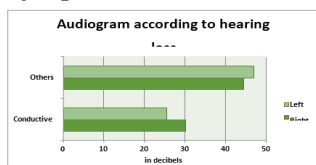


Table 10: Pearson correlation analysis

	Age	Duration of Discharge	Right	Left
Pearson Coefficient	0.1406	0.0986	0.3642	0.5264
P Value	>0.05	>0.05	<0.01	<0.01

Pearson correlation shows as the age, duration of otorrhoea and the audiogram values increases, there are more chances of mixed hearing loss rather than conductive deafness alone.

DISCUSSION

Chronic Otitis media is one of the commonest ear diseases in developing countries. Tympanic membrane perforation due to COM is one of the common reasons of hearing impairment.

In this study one hundred patients of COM of different age groups were studied. In this 43% were women and 57% were men. This might be due to increased prevalence of COM among male or it might be simple reflection of overall high male attendance in hospital. This might also be mere reluctance of women in our country to come forward for treatment. 48% of them had purely conductive type of hearing loss and the remaining 52% had other types of hearing loss either mixed or sensorineural type.

Among the pattern of hearing loss, this study showed that 48% patients had conductive type of hearing loss, 52% had mixed type of hearing loss. Majority of the studies have proved that conductive type of hearing loss was the most common type of hearing loss following COM. But some studies have demonstrated sensorineural hearing loss occurs in chronic otitis media. One such study showed 7.7% patients suffered from sensorineural hearing loss due to COM & yet another study showed that sensorineural hearing loss occurs particularly in older patients with COM which has usually been present for longer periods. The probable causes are the passage of toxin through round window membrane that causes biochemical changes in the perilymph and endolymph resulting in gradual destruction of organ of corti.

The mean age of people with conductive hearing loss (35.4 years) was lesser comparative to the mean age in people with other varieties of hearing loss (38.63 years) due to COM.

The mean duration of COM is lesser in patients with conductive type of hearing loss, suggesting that the severity of hearing loss may be associated with increasing duration of disease.

The mean audiogram findings were comparatively higher in the other type of hearing loss compared to the conductive variety in both right and left ear.

Pearson correlation analysis shows as the age of the patient, duration of discharge and the audiogram values increases, there are more chances of sensorineural hearing loss rather than conductive type of hearing loss alone.

CONCLUSION

From this study it can be concluded that the earlier theoretical knowledge on Chronic Otitis Media causes conductive hearing loss cannot be applied universally. In our study, it is mixed hearing loss which is in higher prevalence than the pure conductive variety in the study population suggestive of the sensorineural contribution. However much more clear idea on type of hearing loss in COM can be documented with further studies involving larger population.

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