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# TYPE OF HEARING LOSS AMONG CHRONIC SUPPURATIVE OTITIS MEDIA PATIENTS

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**Date Received:**

5<sup>th</sup> June 2023

**Date Revised:**

8<sup>th</sup> January 2024

**Date Accepted:**

13<sup>th</sup> January 2024

## ABSTRACT

**Objective:** This study aims to explore the type of hearing loss in patients with chronic suppurative otitis media.

**Methodology:** This cross-sectional study with non-probability purposive sampling technique was carried out at The Children Hospital and The Institute of Child Health (CHICH) and Mayo Hospital Lahore, Duration was 6 months (May 2023 to October 2023). Sample size was 145 CSOM patients of both gender (male, female) with ages 5 to 40 years were included. Patient with CSOM with any comorbid factors were excluded. A pre-design performa and pure tone audiometry were used. Data was analysed through SPSS version 23.0 package.

**Results:** Out of 145 patients, 62 (42.8%) male and 83 (57.2%) female patients. Most patients 37 (25.5%) were in age group 10 to 15 years. 105 (72.4%) patients had earache and drainage in their ears. Patients with tubo-tympanic type perforation were 119 (82.1%) and with attico-antral type perforation were 26 (17.9%). Conductive hearing loss 103 (71%) was the most prevalent type with moderate degree 63 (61.2%) whereas, sensorineural hearing loss was 15 (10.3%) from which mostly had moderately severe degree 5 (33.3%), and mixed hearing loss was 27 (18.6%) with mostly patients had moderately severe degree 18 (66.7%).

**Conclusion:** Conductive hearing loss was the most prevalent type with majority have moderate degree. Patients with tubo-tympanic perforation is more common than attico-antral. Whereas, sensorineural hearing loss and mixed hearing loss is also seen in these patients.

**Keywords:** Suppurative Otitis Media; Hearing Loss; Pure Tone Audiometry.

## INTRODUCTION

Chronic suppurative otitis media (CSOM) is defined as chronic otorrhea (lasting longer than 6–12 weeks) through a perforated tympanic membrane. CSOM is frequently linked to recurrent respiratory tract infections and low socio-economic situations (poor hygiene, and poor nutrition).<sup>1</sup> Perforation that is permanent chronic otitis media of the suppurative kind is characterized by persistent middle ear discharge. Hearing impairment are severe intracranial problems that are all possible outcomes of CSOM.<sup>2</sup>

Auditory testing is used to diagnose hearing loss and identify impairment in hearing acuity. The lowest level (threshold) at which a sound may be perceived is between 0 to 25dB, and this is considered normal hearing function. Numerous physiologic techniques, such as auditory brainstem response assessments, impedance measurement (tympanometry), and otoacoustic emissions.<sup>3</sup>

In more than half of patients, chronic otitis media causes mild to moderate degree hearing loss. Hearing loss (HL) has been seen in patients with CSOM as an increase in air conduction thresholds and normal bone conduction thresholds. The size and location of the tympanic membrane defect, impairment of ossicles in middle ear, all influence the sound carrying mechanism and determine the kind and degree of deafness.<sup>4</sup>

In patients with CSOM, audiometry is a reliable examination for assessing the severity of hearing loss and the stability of tympano-ossicular system.<sup>5</sup> Because hearing loss is now the most prevalent problem associated with CSOM. It impacts an individual's daily routines and overall standards of living. As a result, an attempt has been made to investigate hearing loss in CSOM patients using audiometry.<sup>6</sup>

Conductive type hearing loss is the most common type. Perforation of the ear drum or ossicular necrosis or fixation cause conductive hearing loss.<sup>7</sup> The mucosal disease and the squamous disease are the two

### This article may be cited as

Mehwish, Sultan H, Badar SA, Shanawar M, Tahir F, Mukhtar F, Batool S. Type of hearing loss among chronic suppurative otitis media patients. *J Postgrad Med Inst* 2024;38(1):21-25. <http://doi.org/10.54079/jpmi.38.1.3267>

subcategories of CSOM. The tubo-tympanic is also known as the safe CSOM, whereas the attico-antral is known as the squamous CSOM. Attico-antral CSOM is the most hazardous kind due to the presence of bone osteitis, granulation tissue, and cholesteatoma. Attico-antral CSOM is a hazardous kind of CSOM that affects the posterior superior region of the middle ear, which then affects the inner ear.<sup>8</sup>

The eardrum not only transmits sound waves through the middle ear, but it also safeguards the middle ear space by shielding the round window from direct acoustic energy, a function known as "round window baffle".<sup>9</sup> The inner ear hearing system is affected by chronic inflammatory activities in the middle ear. Recurrent ear infections cause toxins and macromolecules to be absorbed into the cochlea through the thin round window membrane, resulting in sensorineural hearing loss (SNHL).<sup>10</sup> Chronic inflammatory processes, such as vasodilation and vasoconstriction of vessels of mucosa in the round window membrane, cause circulatory disturbances that impact the inner ear. Toxins that cross the round window membrane and affect the cochlear basal turn cause permanent cochlear hair cell loss.<sup>11</sup>

Very limited data is available regarding it to focus on the type and severity of hearing loss among chronic suppurative otitis media patients in developing countries especially in Pakistan. This research provides insights into the disease's impact on auditory health, guiding appropriate treatments and preventive measures for optimal patient outcomes

## METHODOLOGY

Research Ethics Committee (REC) of Faculty of Allied Health Sciences, University of Lahore approved the work at date 27th April 2023 with REC no. 94.

The cross-sectional study with non-prob-

ability purposive sampling technique was carried out at, The Children Hospital and The Institute of Child Health (CHICH) and Mayo Hospital Lahore. Duration was 6 months (May 2023 to October 2023). Sample size was 145 patients which was calculated through online calculator on the basis of prevalence of Hearing Impairment 43.84% by using 95% confidence level and 5% confidence interval.<sup>12</sup> Patients of both gender (male, female) with ages 5 to 40 years were included. It included all those patients having CSOM. Patient with any comorbid factors (History of head injury, Acoustic trauma, cardiovascular disease, ototoxic drugs, and metabolic disease, and genetic causes) were excluded. A pre-design performa and pure tone audiometry were used to accumulate the data. Patients of CSOM were interviewed with the help of performa. After taking the written consent from the patients, their hearing was assessed through pure tone audiometry to check the type and severity of hearing loss. Otoscopic examination were performed to see the Outer ear canal and ear drum. Pure Tone Audiometry (PTA) had done to examine the type and severity of Hearing loss. First, collected data was entered into an SPSS spreadsheet. The SPSS version 23.0 package was then used to process it and perform statistical analysis. Frequencies and percentages were used to report qualitative variables such as age and gender.

## RESULTS

In Table 1 shows that, out of 145 patients. Patients with age between 5 to 10 years 21.4% (n=31), 11 to 15 years 25.5% (n=37), 16 to 20 years 2.8% (n=4), 21 to 25 years 6.9% (n=10), 26 to 30 years 15.9% (n=23), 31 to 35 years 20.0% (n=29) and 36 to 40 years are 7.6% (n=11). The most frequently age range is 10 to 15 years of patients with CSOM. 42.8% (n=62) Male and 57.2% (n=83) Female are patients in this research.

The results of Table 2 shows that out of 145 patients 69.7% (n=101) are previously evaluated and 30.3% (n=44) are not being previously evaluated. 11.7% (n=17) patients have ringing in their ears. 72.4% (n=105) patients have earache and drainage in their ears and 27.6% (n=40) patients have no earache and drainage in their ears within last 90 days. 98.6% (n=143) patients get medical treatment for their ears and 1.4% (n=2) patients never get medical treatment for their ears. It shows that 4.8% (n=7) patients have their hearing tested and 95.6% (n=138) patients have never tested their hearing. After that taking family history 12.4% (n=18) patients have family history of hearing loss and 87.6% (n=127) patients have no family history of hearing loss. Out of (n=145) patients with CSOM, there are 82.1% (n=119) patients with Tubo-Tympanic type and 17.9% (n=26) patients with Attico-Antral type.

The results of Table 3 shows that CSOM

Table 1: Distribution of Survey Respondents by age and Gender

Variable	Response	Frequency (f)	Percentage (%)
Age groups (years)	5 to 10	31	21.4%
	11 to 15	37	25.5%
	16 to 20	4	2.8%
	21 to 25	10	6.9%
	26 to 30	23	15.9%
	31 to 35	29	20%
	36 to 40	11	7.6%
Gender	Male	62	42.80%
	Female	83	57.20%

Table 2: Survey Responses on Ear Health and Hearing of patients

Variable	Response	Frequency (f)	Percentage (%)
Previous evaluation	Yes	101	69.7%
	No	44	30.3%
Have you ever had a Ringing in your Ears	Yes	17	11.7%
	No	128	88.3%
Have you had earaches or drainage from your ears within the last 90 days?	Yes	105	72.4%
	No	40	27.6%
Have you ever had medical / Surgical treatment for your ears?	Yes	143	98.6%
	No	2	1.4%
Have you ever had your hearing tested?	Yes	7	4.8%
	No	138	95.2%
Does anyone in your family have hearing loss?	Yes	18	12.4%
	No	127	87.6%
Types of CSOM	Tubo-Tympanic Type	119	82.1%
	Attico-Antral Type	26	17.9%

Table 3: Classification and Degree of Hearing Loss among Respondents

Variable	Response	Frequency (f)	Percentage (%)
Types of Hearing Loss	Conductive Hearing Loss	103	71%
	Sensori-neural Hearing Loss	15	10.3%
	Mixed Hearing Loss	27	18.6%
Degree of Hearing Loss among Conductive Type	Mild Degree	40	38.8%
	Moderate Degree	63	61.2%
Degree of Hearing Loss among	Mild Degree	3	20%
	Moderate Degree	4	26.7%
	Moderately Severe	5	33.3%
	Severe Degree	3	20%
Degree of Hearing Loss among Mixed Type	Moderate Degree	5	18.5%
	Moderately Severe	18	66.7%
	Severe Degree	4	14.8%

(n=145) distributes into different types of hearing loss where 71% (n=103) Conductive Hearing Loss, 10.3% (n=15) Sensori-neural Hearing Loss and 18.6% (n=27) Mixed Hearing Loss. In that Conductive Type (n=103) distributes into 38.8% (n=40) Mild Degree Hearing Loss, 61.2% (n=63) and Moderate Degree Hearing Loss. Whereas in Sensorineural Type (n=15) distributes into 20% (n=3) Mild Degree Hearing Loss, 26.7% (n=4) Moderate Degree Hearing Loss, 33.3% (n=5), Moderately Severe Degree Hearing Loss and 20% (n=3) Severe Degree Hearing Loss. Then the Mixed Type (n=27) distributes into 18.5% (n=5) Moderate Degree Hearing Loss, 66.7% (n=18), Moderately Severe Degree Hearing Loss and 14.8% (n=4) Severe Degree Hearing Loss.

## DISCUSSION

CSOM is a long-term inflammation of the mastoid cavity or middle ear is distinguished by repetitive or chronic discharge from the ear (otorrhea), resulting from perforation in the tympanic membrane. It is characterized by a perforated tympanic membrane and recurrent bacterial infections, often causing hearing loss. Treatment may involve antibiotics, ear cleaning, and, in some cases, surgical intervention.<sup>13</sup> Present study shows that prevalence of tubo-tympanic type (Safe) 82.1% and atticoantral type (Unsafe) 17.9%. In contrast previous study conducted in 2010 by Mohammed Shafiquil Islam. Result showed that the prevalence of tubo-tympanic type (Safe) 81.31% and atticoantral type

(Unsafe) 18.69%.<sup>14</sup>

Current study shows that the prevalence of conductive hearing loss 71.0%, mixed hearing loss 18.6% and sensorineural hearing loss 10.3%. Precious study conducted by Moruskar A in 2019. Results showed that prevalence of conductive type was 72% and mixed type was 28%.<sup>15</sup> Contrary to a study conducted in 2018 by SM Parmar. Results showed that most of patients had (80%) conductive hearing loss followed by (17.17%) mixed hearing loss and sensorineural hearing loss (2.01%).<sup>16</sup> Previous study conducted in 2018 by Shuaibu IY. Results of the study showed that prevalence of conductive hearing loss was 50%, prevalence of sensorineural hearing loss was 20%

and mixed hearing loss was 30%.<sup>17</sup>

Current study shows that 40 (38.8%) have mild degree conductive hearing loss, 63 (61.1%) have moderate degree conductive hearing loss. In contrast previous study conducted in 2016 by Asaduzzaman AK. Result showed that (38.5%) 20 had a mild degree conductive hearing loss, and (26.9%) 14 had a moderate degree hearing loss.<sup>10</sup>

According to this study the prevalence of sensorineural hearing loss is 15 (10.3%) from which mostly had moderately severe degree 5 (33.3%). Contrary a study conducted in 2017 by Abd Elrheem Ahmed Singer. To evaluate hearing loss in CSOM patients. 10% of the patients in this study had SNHL.<sup>18</sup> Another study conducted by Syed Sajjad Ali Zaidi in 2016. To determine how frequently chronic suppurative otitis media causes sensorineural hearing loss. According to their results 52% had SNHL, and it was discovered that the frequency increased with longer duration.<sup>19</sup>

Current study shows that 42.8% are male patients and 57.2% are female patients. In contrast previous study conducted in 2020 by Hapunda RK. Showed that 48% of them were male and 52% were female. Female were relatively more sufferer than male.<sup>20</sup>

## ■ LIMITATIONS

The study only included chronic suppurative otitis media patients. Therefore, the study's results could not be generalized for all types of otitis media. The study was confined to a limited area, potentially restricting the extent of the research.

## ■ RECOMMENDATIONS

Considering the findings indicate substantial damage to the auditory system, specifically the cochlea, future studies need to evaluate the clinical relevance of these

findings. The scope of the study should be expanded to encompass the entire Punjab region in order to facilitate the generalization of results to the population.

## ■ CONCLUSIONS

The study's conclusion highlights Chronic Suppurative Otitis Media (CSOM) as a predominant cause of conductive hearing loss, with mixed hearing loss following and sensorineural hearing loss being the least common. Tubo-tympanic perforations were more prevalent than attico-antral, and the majority of CSOM patients experienced a moderate degree of hearing loss. These findings provide valuable insights into the specific patterns of hearing impairment associated with CSOM, informing targeted interventions for better patient outcomes.

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### Author's Contribution

MS Conceived the idea and designed the study, M and SB collected the data, HS, FT and FM performed data analysis, SAB helped in the write-up of the manuscript. All authors made substantial intellectual contributions to the study.

### Conflict of Interest

Authors declared no conflict of interest

### Grant Support and Financial Disclosure

None

### Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.