

Otitis Media with Persistent Inflammation is a Common Cause of Sensorineural Hearing Loss

FATIMA USMAN¹, MEHREEN BABAR², WAJIH UD DIN SHINWARI³, SAJID RASHID NAGRA⁴, SALMAN AFTAB AHMED⁵

¹Assistant professor, Akhter Saeed Medical and Dental college, RWP

²Assistant Professor, FCPS, CHPE, Wah Medical College & POF Wah

³Associate Professor, Frontier Medical College, Abbottabad

⁴Associate Professor ENT, Rai Medical College, Sargodha

⁵Assistant Professor, Department of ENT, Rai Medical College Teaching Hospital, Sargodha

Corresponding author: Wajih Ud Din Shinwari, Email: drwajihshinwari@hotmail.com

ABSTRACT

Objective: The purpose of the research was to determine the rate of sensorineural hearing loss that is associated with chronic otitis media.

Study Design: A Descriptive Cross-sectional study

Place and Duration: Frontier Medical College, Abbottabad, from June, 2021 to November, 2021.

Methods: Total 87 patients of both genders had age 15-55 years were presented. All the included patients had chronic suppurative otitis media clinical symptoms. Patients were enrolled after getting informed written consent from the patients. Through the use of a pure tone audiogram, we were able to determine the mean threshold of voice frequencies for sick as well as normal contralateral ears. In sick ears, a mean of more than 25 dB was considered to represent a positive case of SNHL. SPSS 24.0 was used to analyze all data.

Results: We found that 49 (56.9%) patients were males and 38 (43.1%) patients were females. 17 (19.5%) cases had age 15-25 years, 35 (40.2%) patients had age 26-35 years, 25 (28.7%) patients had age 36-45 years and 10 (11.5%) patients were aged between 46-55 years. Majority of the cases 51 (58.6%) were from urban areas. There were 50 (57.5%) cases had chronic otitis media duration <10 months and remaining had disease duration >10 months. Frequency of sensorineural hearing loss was found in 47 (54.02%) cases. Among 47 cases SNHL, 32 cases were aged between 31-55 years.

Conclusion: We concluded in this study that patients with chronic otitis media had significantly higher number of sensorineural hearing loss, Among SBHL cases, patients were mostly aged between 31-55 years and disease duration was >10months.

Keywords: Otitis Media, Sensorineural Hearing Loss,

INTRODUCTION

One possible public health concern is persistent middle ear infection. Over two billion dollars are spent annually in the United States alone to treat both severe and chronic ear infections[1]. Children's hearing loss is most commonly caused by chronic otitis media, which has a frequency of 72 cases per 1,000 people in impoverished countries[2]. Epidemiological research in Brazil has linked chronic otitis media with hearing loss in school-aged children. Conductive hearing impairment is the defining audiologic change in cases with abscess chronic otitis media (SCOM), which may or may not be linked to the growth of a cholesteatoma. Sensorineural hearing impairment (SNHL) has been linked to chronic otitis media, however this connection is still up for debate. Frequencies reported in the literature range from those with little clinical significance to those with 10%. This discrepancy may be explained by a shift in the sample size. Certain research fails to distinguish between SCOM without and with cholesteatoma[3,4]. Although cholesteatomas were not specifically taken into account by other researchers when evaluating SCOM, they were nevertheless considered. The relationship between SNHL and the age of the patient or the length of time they've had chronic otitis media is a topic of heated debate. The societal and economic context in which SNHLs emerge may also have a role. [6,7]

Bone conduction (BC) threshold elevation [8], indicative of sensorineural injury, has been previously seen in CSOM with and without cholesteatoma, with a maximal prevalence of 52.00%. Related to this phenomena, labyrinthitis exposes a portion of the inner ear to the environment of the damaged middle ear via the lateral semicircular canal, allowing harmful chemicals to enter the inner ear through the circular window membrane [8,9].

The deleterious consequences of HL on language, speech, educational advancement, and socialising [9] need careful consideration regardless of the degree and type of HL in CSOM, with or without cholesteatoma, especially during lengthy periods of illness.

Injuries to the eardrum, ossicular ring, and inner ear can all contribute to HL, with varying degrees of severity. Cholesteatoma-associated CSOM is the most severe form of CSOM, with 80 percent or more ossicular erosion [10], with otherwise similar

audiological characteristics. Comparing CSOM with and without cholesteatoma, sensorineural HL (SNHL) was not significantly different in a prior research [11].

Studies [11,12] have demonstrated that the length of time a patient has had CSOM, with or without cholesteatoma, should be considered a high risk for sensorineural impairment. Consideration should also be given to confounding factors such as sex, age, the severity of hearing loss (HL), and the existence or absence of cholesteatoma, all of which have been linked to sensorineural damage.

The two main categories of CSOM are atticointral and tubotympanic. Atticoantral illness is characterised by a sparse discharge accompanied by a foul odour; perforation of the TM typically occurs at the borders of the TM; and the presence of cholesteatoma, granulations, and other problems. Tubotympanic illness is characterised by persistent and excessive ear drainage caused by a rupture in the middle of the TM. Because of the lack of risk of cholesteatoma and other consequences, many doctors and patients wait surgical repair for as long as a year or more between bouts of infection, and simply use conservative medicinal therapy for subsequent episodes. However, this illness's security is debatable in terms of long-term hearing health. The inner ear's hearing system is impacted by middle ear inflammation that persists over time. Sensorineural hearing loss can occur when toxins and macromolecules are absorbed into to the cochlear through the thin round windows membrane as a result of chronic ear infections caused by a perforated ear drum (SNHL). [13,14] Different investigations found varying levels of SNHL in CSOM. While some found no evidence of severe SNHL, others felt that early therapy was necessary owing to severe SNHL loss and so recommended it. [15]

The purpose of this research was to establish the rate of SNHL among those with CSOM.

MATERIAL AND METHODS

This descriptive/cross-sectional study was conducted at Frontier Medical College, Abbottabad, from June, 2021 to November, 2021 and comprised of 87 patients. Patients were enrolled after getting informed written consent from the patients. The study did not

include participants who had a personal or family history of SNHL, used ototoxic medications, or had experienced ear damage in the past. Those who had insufficient data or an audiogram performed elsewhere were also disqualified. No adverse events were reported by any patients participating in the trial, and patient anonymity was preserved throughout.

In this study, we looked at individuals who had been diagnosed with CSOM and had either never had their ears operated on before or had a condition that was unilateral and tubotympanic in nature. When the audiogram was being performed, the audiologist wasn't aware of the diagnosis so that they could avoid being influenced by it. On the basis of an audiogram, the average of three speech frequencies was determined, and a mean that was greater than 25 dB was considered to indicate SNHL positivity. The prevalence of SNHL was determined by the use of frequencies and percentages, and a comparison was made between the trend of afflicted individuals and the length of the CSOM. Every piece of data was analyzed by utilizing SPSS 24.

RESULTS

We found that 49 (56.9%) patients were males and 38 (43.1%) patients were females. 17 (19.5%) cases had age 15-25 years, 35 (40.2%) patients had age 26-35 years, 25 (28.7%) patients had age 36-45 years and 10 (11.5%) patients were aged between 46-55 years. Majority of the cases 51 (58.6%) were from urban areas.(table-1)

Table-1: Characteristics of the included cases

Variables	Frequency	Percentage
Gender		
Male	49	56.9
Female	38	43.1
Age (years)		
15-25	17	19.5
26-35	35	40.2
36-45	25	28.7
46-55	10	11.5
Residence		
Rural	36	41.4
Urban	51	58.6

There were 50 (57.5%) cases had chronic otitis media duration <10 months and remaining had disease duration >10 months.(Figure-1)

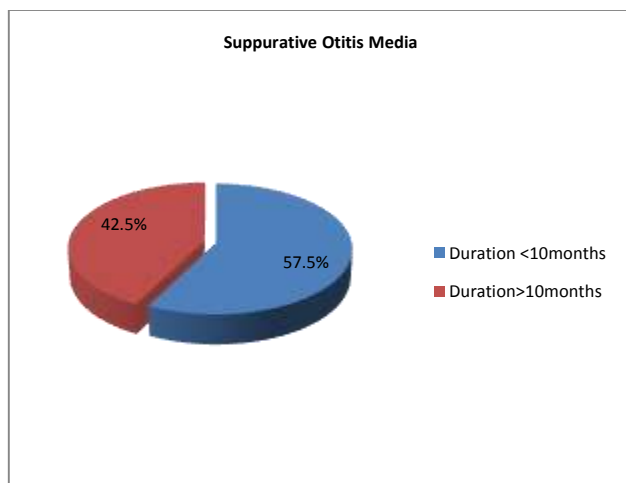


Figure-1: Duration of suppurative otitis media among all cases

Frequency of sensorineural hearing loss was found in 47 (54.02%) cases. Among 47 cases SNHL, 32 cases were aged between 31-55 years.(table-2)

Table-2: Association of SNHL among all cases

Variables	Frequency	Percentage
Sensorineural Hearing Loss		
Yes	47	54.02
No	40	45.98
Age (years)		
<30	15	17.2
>30	32	36.8

DISCUSSION

Hearing loss is by far the most concerning issue that can arise as a result of CSOM, despite the fact that the condition is linked to a variety of other potentially lethal complications. This topic is still debatable in spite of the many research that have found a connection between the CSOM and SNHL. We decided to conduct the study because we were interested in determining whether or not there was a correlation between the two factors in our population. According to the findings of our study, up to 54.02 percent of those who had CSOM also had SNHL in the ear that was affected by the condition. SNHL was found in 43% of patients in CSOM according to Paparella[16], 24% of patients according to Kaur[17], and 12% of patients according to Levine[18]. However, these statistics vary greatly according to the research.

In current study 87 patients were presented. 49 (56.9%) patients were males and 38 (43.1%) patients were females. 17 (19.5%) cases had age 15-25 years, 35 (40.2%) patients had age 26-35 years, 25 (28.7%) patients had age 36-45 years and 10 (11.5%) patients were aged between 46-55 years. Majority of the cases 51 (58.6%) were from urban areas. These showed resemblance to the previous studies.[19,20] A longer period of exposure of the inner ear to inflammation, and therefore to toxins, could increase the portion of patients with SNHL.[21] Previous population studies analysed the effect of the duration of the OM on hearing levels. Thakur et al studied 100 cases (15–50 years of age) presenting with unilateral mucosal COM. They found an SNHL incidence of 23% (hearing level >20 dB), with a statistically significant positive correlation between duration of disease and SNHL.[22] A comparable SNHL incidence of 24% in 100 unilateral CSOM cases (aged 11–50 years) was published by Kaur et al, where the SNHL incidence (defined as hearing level >20 dB) increased with the duration of disease (up to >30 years).[23]

The SNHL was detected in patients with 47% within the first year of CSOM; however, the current research indicated that it was 53.2% frequent in instances and first year of complaint. [24] There has been a reported 45 percentage point rise in the frequency within the first five years. Similar and precise results were interpreted based on the most recent study, which found that 47.8 percent of SNHL patients were reported in the second year after the complaint. [25] Higher frequencies were reported to be more affected in individuals with COM who had a substantial degree of SNHL by Kolo ES et al[26]. While older individuals and those with longer histories of otorrhea tend to have more severe SNHL, neither of these factors appears to correlate with the severity of SNHL in patients with COM. [27] A research showed that 34.56% of school-aged children had some form of hearing loss, and that 16.95% had COM, indicating that their hearing loss was mild to moderate (41-60 dB). 1 Researchers Kamaljit Kaur et al. [28] found that SNHL was present in 24% of their COM patients. Our findings are consistent with those of a previous study by Amin Amali and colleagues[29], which showed that COM is linked to SNHL and cochlear damage.

It has also been reported that there is a clear correlation between the onset of age and the development of SNHL complications, with a risk ratio of up to 0.61 dB per year in SNHL compared to 0.13 dB per year in normal instances. Reports indicate that tympanoplasty, an otogenic surgical technique, has a high success rate, and that waiting to have the surgery done increases the risk of SNHL-related morbidity.[30]

CONCLUSION

We concluded in this study that patients with chronic otitis media had significantly higher number of sensorineural hearing loss, Among SBHL cases, patients were mostly aged between 31-55 years and disease duration was >10months.

REFERENCES

- 1 Bluestone CD. Recent advances in the pathogenesis, diagnosis, and management of otitis media: *Pediatr Clin North Am*, 28 (1981), pp. 727-755
- 2 Ologe FE, Nwawolo CC. Prevalence of chronic suppurative otitis media among school children in a rural community in Nigeria: *Niger Postgrad Med J*, 9 (2002), pp. 63-66
- 3 Kaplan DM, Fliss DM, Klaus M, Dagan R, Leiberman A. Audiometric findings in children with chronic suppurative otitis media without cholesteatoma. *Int J Pediatr Otorhinolaryngol*, 35 (1996), pp. 89-96
- 4 Vartiainen E, Vartiainen JA. Age and hearing function in patients with chronic otitis media. *J Otolaryngol*, 24 (1995), pp. 336-339
- 5 Cusimano F, Cocita VL, D' Amico A. Sensorineural hearing loss in chronic otitis media. *J Otolaryngol Otol*, 103 (1989), pp. 158-163
- 6 Islam MS, Islam MR, Bhuiyan MAR, et al. Pattern and degree of hearing loss in chronic suppurative otitis media. *Bangladesh Journal of Otorhinolaryngology* 2010;16:96-105
- 7 Gulustan F, Yazici ZM, Sayin I, et al. Evaluation of the Presence of Sensorineural Hearing Loss and the Relationship With Intraoperative Findings in Cholesteatoma. *Ear Nose Throat J* 2021;100:249S-52S
- 8 Ali Zaidi SS, Pasha HA, Suhail A, et al. Frequency of Sensorineural hearing loss in chronic suppurative otitis media. *J Pak Med Assoc* 2016;66:S42-4
- 9 Jestic SD, Jotic AD, Babic BB. Predictors for sensorineural hearing loss in patients with tubotympanic otitis, cholesteatoma, and tympanic membrane retractions. *Otol Neurotol* 2012;33:934-40.
- 10 Redaelli de Zinis LO, Campovecchi C, Parrinello G, et al. Predisposing factors for inner ear hearing loss association with chronic otitis media. *Int J Audiol* 2005;44:593-8
- 11 Nagle SK, Jagade MV, Gandhi SR, et al. Comparative study of outcome of type I tympanoplasty in dry and wet ear. *Indian J Otolaryngol Head Neck Surg* 2009;61:138-40
- 12 Sadasivan SS, Viswanatha B, Satish HS, et al. A comparative study of sensorineural hearing loss in mucosal and squamous type of chronic otitis media. *Research in Otolaryngology* 2015;4:13-7.
- 13 Schachern P, Tsuprun V, Cureoglu S, Ferrieri P, Briles D, Paparella M, et al. The Round Window Membrane in Otitis Media. *Arch Otolaryngol Head Neck Surg* 2008; 134: 658-62
- 14 Paparella MM, Morizono T, Le CT, Mancini F, Sipila P, Choo YB, et al. Sensorineural hearing loss in otitis media. *Ann Otol* 1984; 93: 623-9.
- 15 Yoshida H, Miyamoto I, Takahashi H. Is sensorineural hearing loss with chronic otitis media due to infection or aging in older patients? *Auris Nasus Larynx* 2009; 36: 269-73
- 16 Paparella MM, Morizono T, Le CT, Mancini F, Sipila P, Choo YB, et al. Sensorineural hearing loss in otitis media. *Ann Otol* 1984; 93: 623-9.
- 17 Kaur K, Sonkhya N, Bapna AS. Chronic suppurative otitis media and sensorineural hearing loss: is there a correlation?. *Ind J Otolaryngol Head Neck Surg* 2003; 55: 21-4.
- 18 Levine BA, Clough S. Sensorineural hearing loss in chronic otitis media, Is it clinically significant? *Arch Otolaryngol Head Neck Surg* 1989; 115: 814-6.
- 19 Papp Z, Rezes S, Jókay I, Sziklai I. Sensorineural hearing loss in chronic otitis media. *Otol Neurotol*. 2003 Mar;24(2):141-4.
- 20 Ali Zaidi SS, Pasha HA, Suhail A, Qureshi TA. Frequency of Sensorineural hearing loss in chronic suppurative otitis media. *J Pak Med Assoc*. 2016 Oct;66(Suppl 3)(10):S42-S44. PMID: 27895351.
- 21 Rajput MS-E-A, Rajput MSA, Arain AA, et al. Mucosal type of chronic suppurative otitis media and the long-term impact on hearing loss. *Cureus* 2020;12:1-8.
- 22 Thakur CK, Gupta A, Kumar A. Does mucosal chronic otitis media leads to sensorineural hearing loss. *Indian J Otolaryngol Head Neck Surg* 2019;205:1-3.
- 23 Kaur K, Sonkhya N, Bapna AS. Chronic suppurative otitis media and sensorineural hearing loss: is there a correlation? *Indian J Otolaryngol Head Neck Surg* 2003;55:21-4
- 24 Elzinga HBE, van Oorschot HD, Stegeman I, et al. Relation between otitis media and sensorineural hearing loss: a systematic review. *BMJ Open* 2021;11:e050108. doi: 10.1136/bmjopen-2021-050108
- 25 Ali S, Junaid M, Khan AR, Khan AA, Muhammad N, Khan A. Sensorineural Hearing Loss in Chronic Otitis Media: A Cross Sectional Descriptive Study at Tertiary Care Hospital. *J Med Sci* 2020 October;28(4):361-363
- 26 Kolo ES, Salisu AD, Yaro AM, Nwaorgu OG. Sensorineural hearing loss in patients with chronic suppurative otitis media. *Indian J Otolaryngol Head Neck Surg*. 2012 Mar;64(1):59-62.
- 27 Baloch MA, Baloch SK, Rasheed S. Myringoplasty in simple chronic otitis media. *Gomal J Med Sci*. July-Dec 2012;10:216-8.
- 28 Kaur K, Sonkhya N, Bapna AS. Chronic suppurative otitis media and sensorineural hearing loss: Is there a correlation?. *Indian Journal of Otolaryngology and head and neck surgery*. 2003 Mar 1;55(1):21-4
- 29 Amali A, Hosseinzadeh, Samadi S, Nasiri S, Zebardast J. Sensorineural hearing loss in patients with chronic suppurative otitis media: Is there a significant correlation? *Electron Physician*. 2017; 9(2): 3823-3827.
- 30 SAYYED MUDDASIR SHAH1, SAHIBZADA FAWAD KHAN2, MUBASHAR ULLAH JAN3, HAIDER ZAMAN. Frequency of Sensorineural Hearing Loss in Chronic Otitis Media. *P J M H S* Vol. 16, No. 05, May 2022 339