Original Article

Frequency Of Sensori Neural Hearing Loss(SNHL) In Chronic Suppurative Otitis Media (CSOM) Patients At A Tertiary Care Center In Pakistan

Dr. Zubair Anwar[1], Dr. Muhammad Imran Bhatti[2] Dr. Saad Abdur Rehman Afaque[3], Dr. Muhammad Razzaq Dogar[4*], Dr. Rehana[5] Dr. Adnan Anwar[6]

[1]MBBS.DLO.MCPS.FCPS.FEBORL-HNS, Assistant Professor, ENT, Head &Neck Surgery Department, Jinnah Post Graduate Medical Centre, Karachi
[2]MBBS.FCPS, Senior Registrar Department of ENT, Head & Neck Surgery of Liaqat University of Medical and Health Science, Jamshoro
[3]MBBS.FCPS, Senior Registrar in Department of ENT, Jinnah Postgraduate Medical and Dental College, Karachi
[4]MBBS, DLO, FCPS, Head of Department ENT, Head & Neck Surgery Department
Jinnah Post Graduate Medical Centre, Karachi
[5]MBBS, FCPS, Assistant Professor ENT, Head & Neck Surgery Department, Fatima Hospital, Baqai Medical University, Karachi
[6]MBBS, M.Phil. Associate Professor Department of Physiology
*Corresponding Author: Muhammad Razzaq Dogar, MBBS, DLO, FCPS, Head of Department ENT, Head &Neck Surgery Department, Jinnah Post Graduate Medical Centre, Karachi
Email address: dogarent1@gmail.com
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Abstract

Background: CSOM is associated with functional damage to the ear which can present as SNHL; however published literature shows mixed associations.

Study design and setting: Cross-sectional observational study at Jinnah Postgraduate Medical Center, Karachi, Pakistan.

Methodology: The study sampling technique was non-probability consecutive sampling technique. Patients of either gender and between the ages of 10-50 years, diagnosed with CSOM within the last six months were included while patients with a previous history of SNHL, usage of ototoxic drugs, trauma to ear or those not willing to give consent for the study were excluded. SPSS v23.0 was used for data analysis and chi-square test was applied, keeping p-value of <0.05 as statistically significant.

Results: From the total of 200 patients with mean age of patients 24.7 ± 8.42 years. The mean duration of CSOM was 6.56 ± 4.28 years. 145 (72.5 %) were male while 55 (27.5 %) female. SNHL was found to be positive in 36 (18 %) of patients while 165 (82 %) were negative for SNHL. With respect to duration to disease, SNHL was reported to be positive in 11 (10.9 %) of patients having duration of CSOM between 2-6 years while in 25 (25.3 %) of patients having CSOM for over 6 years. A significant difference of p-0.008 was observed in both the groups.

Conclusion: According to the results of this study, SNHL is significantly associated with CSOM with higher frequencies observed in males and in patients with CSOM for longer durations.

Keywords: Sensory Neural Hearing Loss, Chronic Suppurative Otitis Media, Middle Ear Infections, Inner Ear Infections

INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) is commonly attributed with morbidity due to deafness, especially in the developing parts of the world (1). The most frequent variety of CSOM encountered in Ear Nose Throat (ENT) clinics is the tubo-tympanic (safe) variety (2). The role of chronic inflammation in middle ear leading to Sensori Neural Hearing Loss (SNHL) is yet unclear (3). In CSOM patients, the hearing impairment often tends to affect the air-conduction component, nonetheless, affected bone-conduction and SNHL possibility has been reported in literature (4).

Conductive hearing loss because of middle ear diseases can be treated well through surgery (5). However, in CSOM, if it is associated with functional damage to ear, then surgery does not treat the underlying cause (6). It tends to present as a lesion of the inner ear, resulting in dizziness and SNHL (7). Some researchers have reported significant association in-between CSOM causing SNHL, whilst other researchers have found negligible association (8).

The studies reporting SNHL due to CSOM are of the assumption that mediators of inflammation like agents which can cause inner ear's function to deteriorate. SNHL however can occur in plenty of ways (9). Mediators of inflammation probably enter the inner ear via membrane of round window. They can reduce the flow of blood in cochlea (10).

World Health Organization (WHO) states that prevalence of SNHL in CSOM is as high as 7 % in the developing countries, being regarded to be linked with overcrowded and poor socio-economic populations (11). Chronic otitis media, in general is linked to some sort of hearing loss, being the chief complaint of patients (12). In majority of cases, the hearing loss associated with it is conductive, which results from either or rupture of tympanic membrane and alterations in ossicular chain because of erosion or fixation caused by the process of chronic inflammation (13).

CSOM is traditionally divided into two types' viz., atticoantral and tubo-tympanic.In atticoantral type, scanty discharge is observed along with foul smell and perforation of tympanic membrane which is involved in many casesalong its margins (14). Such condition is associated with granulations, Cholesteatoma and other complications (15). In the other type of CSOM, profuse recurrent discharge from ear is observed with xxc aZ (16). Such type of CSOM is not Cholesteatoma-related and is considered a safe disease with treating clinically generally delaying surgery while only advising conservative medicinal treatment even with recurrent infection episodes (17).

The objective of this study was to determine frequency of Sensorineural Hearing Loss SNHL in patients with Chronic Suppurative Otitis Media CSOM.

MATERIAL AND METHODS

This was a cross-sectional observational study carried out at the Department of Ear Nose and Throat (ENT) of Jinnah Postgraduate Medical Center (JPMC), Karachi for duration of six months. A non-probability consecutive sampling technique was used. Patients of either gender and between the ages of 10-50 years, diagnosed with CSOM within the last six months were included in the study while patients with a previous history of SNHL, usage of ototoxic drugs, trauma to the ear or those not willing to give consent for the study were excluded. The sample size was calculated keeping 7 % margin of error, expected frequency of SNHL among CSOM patients at 52 % and 95 % confidence level, the sample size came out to be 200.

Data Collection Procedure

After taking ethical approval from the Ethical Review Committee of JPMC, the study was started. Patients diagnosed with CSOM, fulfilling the inclusion and exclusion criteria were included in the study. Prior to taking consent from the patients, they were thoroughly explained about the study in detail after which written and verbal consent was taken prior to undergoing of any procedure. Data collection included demographics of the patients. Blinding of audiologist was done at the time of diagnosis and performance of audiogram. The mean three speech frequencies were calculated

using audiogram, mean decibels at <30 dB, which was taken as positive SNHL. All procedures were carried out by principal investigator himself under supervisor's supervision who had at least five years of experience. The final outcome i.e. SNHL was reported on the proforma of each patient.

Data Analysis

For data entry and analysis, SPSS v23.0 was used. For qualitative variables such as age and duration of disease, mean and standard deviation was reported while for quantitative variables like gender and reporting of SNHL, frequency and percentage was recorded. After stratification of data according to age, gender and duration of disease, chi-square test was applied, keeping p-value of <0.05 as statistically significant.

RESULTS

From the total of 200 patients included in the study, the mean age of patients was 24.7 ± 8.42 years. 60 (30 %) of patients were included in the 10-18 years of age group, 120 (60 %) in-between 19-35 years age group while 20 (10%) were >35 years of age. The mean duration of CSOM was 6.56 ± 4.28 years [Table I].

145 (72.5 %) of patients were male while 55 (27.5 %) were female [Figure I].

SNHL was found to be positive in 36 (18 %) of patients while 165 (82 %) were negative for SNHL [Figure II].

With respect to duration to disease, SNHL was reported to be positive in 11 (10.9 %) of patients having duration of CSOM between 2-6 years while in 25 (25.3 %) of patients having CSOM for over 6 years. A significant difference of p-0.008 was observed in both the groups [Table II].

Table I: Baseline demographics of CSOM patients included in the study (n=200)

Variable	Mean ± SD
Mean age (Years)	24.7 ± 8.42
Duration of Disease	6.56 ± 4.28

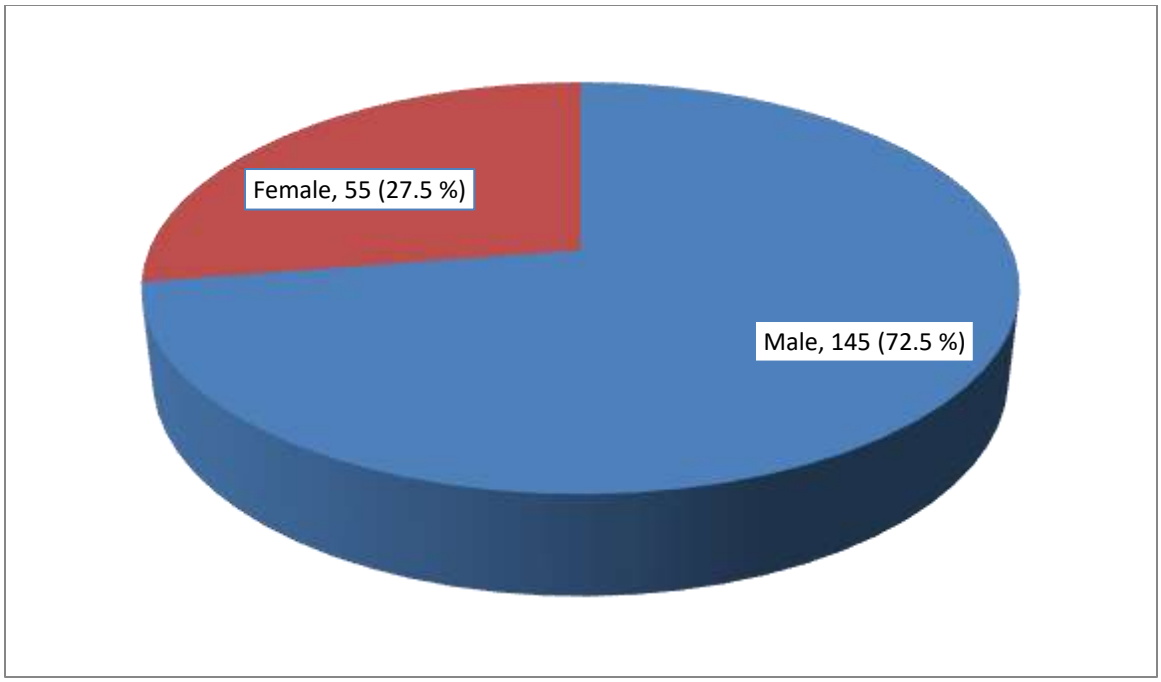

Figure I: Graphical representation of gender distribution of patients (n=200)

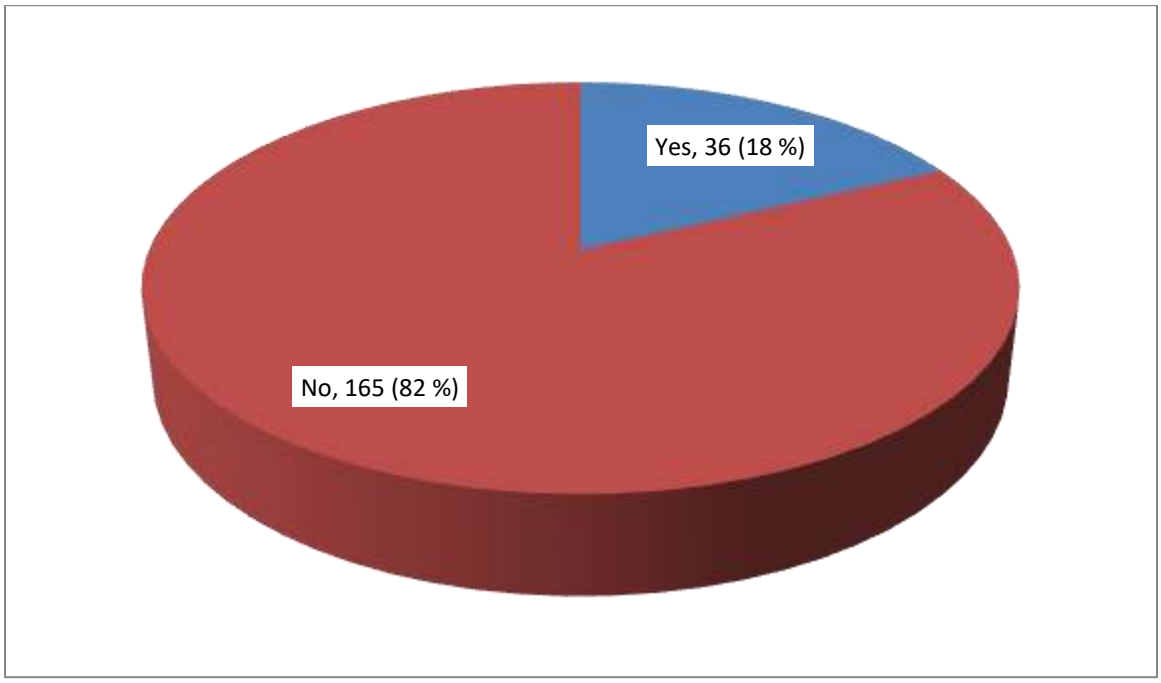

Figure II: Graphical representation of frequency of sensorineural hearing loss (n=200)

Table II: Stratification of Sensorineural hearing loss in terms of duration of CSOM (n=200)

Duration (years)	Sensorineural Hearing Loss		p-value
	Yes	No	
2-6	11 (10.9%)	90 (89.1%)	0.008

>6	25 (25.3%)	74 (74.7%)	

DISCUSSION

In developing countries such as in Pakistan, people tend to ignore ear disorders especially those will ear discharge because of various reasons particularly poverty, illiteracy and lack of awareness and knowledge (18). In routine ENT practice, CSOM is very frequently observed condition in daily practice (19). CSOM is traditionally termed as loss of the conductive hearing component and can cause changes in middle ear, including irreversible changes in mucosa, granulation tissue, formation of Cholesteatoma, destruction of ossicles and tympanosclerosis (20, 21).

Sensorineural hearing loss (SNHL) is termed as having substantial difference in-between bone conduction thresholds between normal and diseased ears. In our study, it was observed that bone conduction thresholds were found to be elevated in diseased ears when tested at all test frequencies and was even more at higher frequencies i.e. 2 kHz and 4 kHz (22).

Mean difference between diseased and normal ear is over 20 dB at all test frequencies, which is in accordance with the borderline threshold defined by WHO (23). Our study reported a significant proportion of patients having with CSOM having SNHL. As the duration of CSOM increased beyond six years, the frequency of SNHL was also reported to increase. In line with our study, other studies have also reported SNHL being substantially associated with CSOM (24). Likewise, as with other studies, there were a few limitations in terms of the process of the nature of disease (either safe or unsafe CSOM) being linked with hearing loss/ degree of hearing loss, disease duration etc. (25). Another important concern is that in this study, deterioration in threshold of bone conduction was used as a measure for damage to inner ear.

A major strength of this study was the type of sampling used appropriately (consecutive sampling) for the study design and selection of samples. Secondly the study briefly determined the frequency of SNHL specifically in patients with CSOM, thus narrowing down the factors causing SNHL. However the study was not free from limitations. Limited sample size and a single-centered study along with short duration of patient follow up were few limiting factors. However further multi-centered studies with greater sample size would be more effective in better achieving the objectives of this study.

CONCLUSION

According to the results of this study, SNHL is significantly associated with CSOM with higher frequencies observed in males and in patients with CSOM for longer durations. Further studies are required to confirm the findings of this study.

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