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Research Article

Mucosal Variety of Chronic Otitis Media (COM) and the Long-Term Impact on Hearing Loss

Md Mashiur Rahman[1]*, Ashraful Islam[2], Md Asaduzzaman[3], Md Mahmudul Amin Sakik[4], Md Mahmudul Hasan Khan[5] and Mohammad Wakilur Rahman[6]

[1]Associate Professor, Department of Otolaryngology and Head Neck Surgery, Basundhara Ad-Din Medical College and Hospital, Dhaka, Bangladesh

[2]Professor and Head, Department of Otolaryngology and Head Neck Surgery, Bangladesh Medical College and Hospital, Dhaka, Bangladesh

[3]Associate Professor and Head, Department of ENT and Head Neck Surgery, Shaheed Monsur Ali Medical College and Hospital, Dhaka, Bangladesh

[4]Registrar, National Institute of ENT, Tejgaon, Dhaka, Bangladesh

[5]Associate Professor, Department of Otolaryngology and Head Neck Surgery, Ad-Din Women's Medical College and Hospital, Dhaka, Bangladesh

[6]Junior Consultant, Specialized ENT Hospital of SAHIC, Mohakhali, Dhaka, Bangladesh

***Corresponding Author:** Md Mashiur Rahman, Associate Professor, Department of Otolaryngology and Head Neck Surgery, Basundhara Ad-Din Medical College and Hospital, Dhaka, Bangladesh.

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Abstract

Background: Chronic otitis media (COM) which keeps fluid from draining from the middle ear is an infection behind the eardrum, can happen after any condition. Such conditions include allergies, cold, sore throat, respiratory infection and even short or long-time hair loss., Although ciliated and non-ciliated cells accumulate on different part of the middle ear cleft, the lining of the middle ear is a modified respiratory epithelium. We have very limited research-based data regarding mucosal variety in chronic otitis media patients and the long-term impact on their hearing loss.

Aim of the Study: The aim of this study was to assess the mucosal variety in chronic otitis media patients and the long-term impact on their hearing loss.

Methods: This prospective observational study initiated in the Department of Otolaryngology and Head Neck Surgery, Dhaka, Bangladesh during the period from July 2021 to June 2022. In total 64 patients with chronic otitis media (COM) suffered for the past three months or more attended the mentioned hospital were included as the study subjects for this study. An ethical approval had been taken from the concerned authority. Ear drums of patients were inspected on both sides suction under microscope wherever necessary. The patients' hearing levels in decibel were tested by a biologically calibrated AA 222 diagnostic audiometer. Data were analyzed by SPSS version 23.0.

Results: Among all our participants, 39% were with hearing loss in left ear, 25% were with hearing loss in right ear and 36% were found with hearing loss in both the ears. The mean ± SD right dB grade of the participants was 49.11 ± 22.50. The mean ± SD left dB grade of the participants was 51.63 ± 21.80. As the right ear comments of patients, we observed that, 33% and 20% patients were with mild conductive type hearing loss and moderate conductive type hearing loss respectively which were noticeable. On the other hand, as the left ear comments of patients we observed that, 23% 20% and 12.5% patients were with mild conductive type hearing loss, moderate conductive type hearing loss and moderately severe conductive type hearing loss respectively which were noticeable.

Conclusion: In development of COM in terms of presence of cholesteatoma, these distinct physiopathologic mechanisms may play a role. Cholesteatoma may lead to demolition of vascular arrangements of patient's ear. So long time untreated ears are at the risks of partially or even total hearing loss.

Keywords: Mucosal Variety; Chronic Otitis Media; Hearing Loss; Tuning Fork Test

Introduction

Otitis media (OM) is an infection behind the eardrum which can happen after any condition that keeps fluid from draining from the middle ear. Such conditions include allergies, cold, sore throat, respiratory infection and even short or long-time hair loss. When any structure of the sensorineural mechanism is impaired, its ability to transduce mechanical energy to electrical energy is reduced resulting in hearing deterioration [1]. Influence of inflammatory factors or mediators of inflammatory reaction, free radicals, or bacterial toxins on cochlear function is also evident for otitis media [2]. It has been suggested that toxins in chronic otitis media (COM) can damage cochlea and in addition to the conductive hearing loss, hearing loss may occur as a result of chronic otitis media (COM) [3]. The anatomical structures of the round window are such that it encourages the stagnation, accumulation and absorption of purulent secretions into the perilymph [4]. In COM, some factors encourage infected tissues or pus to be concentrated at the round window thereby encouraging absorption through the round window leading to chemical contamination of the perilymph [5]. The duration of disease was found to have a significant correlation with increasing incidence of hearing loss and incidence increase especially after 5 years of the disease and the value was noted to be 0.018 [6]. Hearing loss usually occurred only in 13% of patients of COM, and correlated with older age, but not with the presence of cholesteatoma or duration of ear disease [6]. COM should be detected early and should be managed effectively so as to prevent the chances of developing hearing loss [7].

Methodology

This prospective observational study was conducted in the Department of Otolaryngology and, Head Neck Surgery, Bashundara Ad-Din Medical College and Hospital, Bangladesh during the period from June 2121 to July 2022. In total 64 patients with chronic otitis media (COM) suffered for the past three months or more attended the mentioned hospital were included as the study subjects for this study. Ethical committee of the mentioned hospital had been approved this study. Ear drums of patients were scrutinized on both sides pressure under microscope. Predetermined inclusion as well as exclusion criteria were applied while recruiting patients in the study. Prior informed consents from all the patients were obtained. As per the exclusion criteria of this study, patients with history of previous otologic surgery or history of familial hearing loss, patients with previous exposure to ototoxic drugs, frank labyrinthitis and positive fistula tests and cases with history of habitual exposure to noise, meningitis and head trauma were excluded. Tuning fork tests were done using 256, 512 and, 1024 Hz frequencies in each patient. Audiological evaluation included PTA (Pure Tone Audiometry), Speech Audiometry, and Impedance Audiometry. The patients' hearing levels in decibel were tested by a biologically calibrated AA 222 diagnostic audiometer. BC threshold at the affected side were measured at a frequency of 500, 1000, 2000, and 4000 Hz respectively in an acoustically treated sound proof boot which compared with the unaffected ear. Air as well as bone conduction thresholds were also determined. For each site of perforations (1 to 5), the mean hearing loss was calculated through the pure tone average taken at 500 Hz, 1000 Hz and 2000 Hz. The t-test was applied to calculate significance level and the p value of <0.05 was taken as statistically significant.

Result

In this study, among total 64 participants, 50% were male whereas the rest 50% were female. Majority of the participants were from 21-50 years' range. Among them, 20.3%, 31.3% and 17.2% participants were from 21-30 years', 31-40 years' and 41-50 years' age groups respectively. Among all our participants, 39% were with hearing loss in left ear, 25% were with hearing loss in right ear and 36% were found with hearing loss in both the ears. In analyzing the right dB grading of hearing loss of the patients, we observed that, 12.5%, 28.1%, 28.1%, 14.1%, 9.4%, and the rest 7.8% patients were with normal hearing, mild hearing loss, moderate hearing loss, moderately severe hearing loss, severe hearing loss and profound hearing loss respectively. The mean ± SD right dB grade of the participants was 49.11 ± 22.50. In analyzing the left dB grading of hearing loss of the patients, we observed that, 4.7%, 28.1%, 25%, 21.8%, 12.5%, 6.3%, and the rest 1.6% were with normal hearing, mild hearing loss, moderate hearing loss, moderately severe hearing loss, severe hearing loss, profound hearing loss and 'no response condition' respectively. The mean ± SD left dB grade of the participants was 51.63 ± 21.80. As the right ear comments of patients, we observed that, 33% and 20% patients were with mild conductive type hearing loss and moderate conductive type hearing loss respectively which were noticeable. On the other hand, as the left ear comments of patients we observed that, 23% 20% and 12.5% patients were with mild conductive type hearing loss, moderate conductive type hearing loss and moderately severe conductive type hearing loss respectively which were noticeable.

Variables	n	%
Gender distribution		
Male	32	50
Female	32	50
Age distribution		
13-20 yrs.	6	9.4
21-30 yrs.	13	20.3
31-40 yrs.	20	31.3
41-50 yrs.	11	17.2
51-60 yrs.	7	10.9
>60 yrs.	7	10.9

Table 1: Demographic status of Participants (N = 64).

Figure 1: Patients Age Group Wise Distribution (N = 64).

Figure 2: Hearing loss distribution of patients (N = 64).

Right dB (PTA)	n	%
10 to 25 dB (Normal hearing)	8	12.5
26 to 40 dB (Mild hearing loss)	18	28.1
41 to 55 dB (Moderate hearing loss)	18	28.1
56 to 70 dB (Moderately severe hearing loss)	9	14.1
71 to 90 dB (Severe hearing loss)	6	9.4
91-120 dB (Profound hearing loss)	5	7.8
Mean ± SD	49.11 ± 22.50	

Table 2: Right dB grading of hearing loss distribution of patients (N = 64).

Figure 3: Right and Left dB grading of hearing loss of patients (N = 64).

Figure 4: Patients Right and Left Ear hearing comments (N = 64).

Left dB (PTA)	n	%
10 to 25 dB = Normal Hearing	3	4.7
26 to 40 dB = Mild Hearing Loss	18	28.1
41 to 55 dB = Moderate Hearing Loss	16	25.0
56 to 70 dB = Moderately Severe Hearing Loss	14	21.8
71 to 90 dB = Severe Hearing Loss	8	12.5
91-120 dB = Profound Hearing Loss	4	6.3
No Response	1	1.6
Mean ± SD	51.63 ± 21.80	

Table 3: Left dB grading of hearing loss of patients (N = 64).

Right Ear Comments	n	%
Hearing within normal limits	8	12.5
Mild conductive type hearing loss	15	23.4
Mild to moderate conductive type hearing loss	1	1.6
Mild to moderate mixed type hearing loss	1	1.6
Moderate conductive type hearing loss	13	20.3
Moderate mixed type hearing loss	5	7.8
Moderately severe conductive type hearing loss	6	9.4
Moderately severe mixed type hearing loss	3	4.6
Profound sensorineural type hearing loss	5	7.8
Severe mixed type hearing loss	6	9.4
Slight conductive type hearing loss	1	1.6

Table 4: Patients right Ear hearing comments (N = 64).

Left Ear Comments	n	%
Hearing within normal limits	3	4.6
Mild conductive type hearing loss	15	23.4
Mild to moderate conductive type hearing loss	1	1.6
Moderate conductive type hearing loss	13	20.3
Moderate mixed type hearing loss	3	4.6
Moderately severe conductive type hearing loss	8	12.5
Moderately severe mixed type hearing loss	6	9.4
Profound sensorineural type hearing loss	4	6.3
Severe conductive type hearing loss	1	1.6
Severe mixed type hearing loss	5	7.8
Severe to profound sensorineural type hearing loss	1	1.6
Severe to profound mixed type hearing loss	1	1.6
Slight conductive type hearing loss	2	3.1

Table 5: Patients light Ear hearing comments (N = 64).

Discussion

The aim of this study was to assess the mucosal variety in chronic otitis media patients and the long-term impact on their hearing loss. In this study, among total 64 participants, 50% were male whereas the rest 50% were female. Majority of the participants were from 21-50 years' range. Chronic middle ear disease like COM is characterized by the appearance of several histopathological changes. In some studies, it was reported that, increasing of secretory elements, like goblet cells and secreting glands may give rise to different clinic and pathologic stages of the disease [8-10]. In COM patients, in the presence of persistent chronic infection, the ability of the epithelium to restore itself fails and degeneration of the cells with the expansion of differentiated epithelium and the hyperplasia of the basal cells proceeds until the triggering stimulus is eliminated [11]. Among all our participants, 39% were with hearing loss in left ear, 25% were with hearing loss in right ear and 36% were found with hearing loss in both the ears. In analyzing the right dB grading of hearing loss of the patients, we observed that, 12.5%, 28.1%, 28.1%, 14.1%, 9.4%, and the rest 7.8% patients were with normal hearing, mild hearing loss, moderate hearing loss, moderately severe hearing loss, severe hearing loss and profound hearing loss respectively. Morphological changes of the original form from the previous recurrent inflammatory condition does not take place and the mucous membrane remains ready to react even to minimal irritation [12]. As the right ear comments of patients, we observed that, 33% and 20% patients were with mild conductive type hearing loss and moderate conductive type hearing loss respectively which were noticeable. On the other hand, as the left ear comments of patients we observed that, 23% 20% and 12.5% patients were with mild conductive type hearing loss, moderate conductive type hearing loss and moderately severe conductive type hearing loss respectively which were noticeable. Palva and Taskinen [13] in their study of determination of lymphocyte subset in patients with chronic otitis media (COM) have found that 8 of 13 (61.5%) specimens with cholesteatoma had very thin non-inflamed membrane with infiltration of a few lymphoid cells whereas the other 5 specimens consisted of thick epithelium with large sub-epithelial inflammatory infiltration by large numbers of lymphocytic cells [14]. Van der Beek reported that tubal obstruction of the rat resulted with stratification, hyperplasia or transformation of the epithelium and the increase in the number of secretory elements [15].

Limitation of the Study

Though it was a single centered study with a small sample sized, so findings of this study may not reflect the exact scenario of the whole country.

Conclusion and Recommendation

As per the findings of this study, we can conclude that, long time untreated ears are at the risks of partially or even total hearing loss. Patients of our country usually are not well aware of taking treatment at the early stage of these types of hearing loss diseases. It is thinking that, most likely majority of the population of our country belongs to low socioeconomic class and unaware of ear related disease which sometimes seems to less important issue for ensuring proper treatment. So there need to be organizing country wide awareness program by concern authorities and ENT surgeons of hear loss disease like "Mucosal Variety of Chronic Otitis Media (COM)" and long term impact of hear loss. More related studies are needed to be conducted with large sample size coverage country wise for accurate result of the study.

Funding

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Conflict of Interest

None declared.

Ethical Approval

The study was approved by the Institutional Ethics Committee.

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