Original Article

Audiological Evaluation of Otitis Media

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ABSTRACT

Background: Hearing loss is the most frequent sequel of otitis media. Our aim is to assess the hearing thresholds in otitis media and to compare the hearing thresholds with non-diseased ears.

Methods: This is a cross sectional study. We performed pure tone audiometry in patients with otitis media and healthy individuals. Hearing loss was considered when the hearing thresholds were > 25 dB.

Results: Among our 110 patients diagnosed with otitis media (142 ears), 47.3% (52) were male and 52.7% (58) were female. The mean age was 45 years. Among them, 67 (61%) patients had mucosal COM; 04(3.6%) patients had cholesteatoma; 21 (19%) patients had OME and 18(16.3%) patients had AOM. Most patients (63%) had conductive hearing loss. About 35% of the patients had mixed hearing loss and 1.2% had pure sensorineural hearing loss.

Conclusion: Otitis media resulted in higher bone conduction threshold than non-diseased ears ($p < 0.01$).

Keywords: Otitis media, Hearing loss, Hearing threshold

INTRODUCTION

Inflammation in the middle ear cleft is known as otitis media. When inflammation persists more than three months, it known as chronic otitis media (COM). When discharge present, it is considered an active disease. The prevalence of COM was 4.1%, with 3.1% of individuals having unilateral disease and 1.0% having bilateral disease.[1]

When disease extends beyond the confines of the middle ear cleft, it is termed a complication of otitis media. These complications can be classified in different ways, such as by location in the intracranial spaces, chronicity, and degree of complexity. First-order complications result from direct or adjacent involvement of the infection, like mastoiditis, facial palsy in acute otitis media, labyrinthine fistula, and serous labyrinthitis. These complications typically have a clear presentation and diagnosis, can be treated with directed local measures within the temporal bone, and generally have a better prognosis. Second-order complications are the sequel of first order complications. And are more challenging to diagnose. Second-order complications may require a more urgent and specialized intervention.[2]

First-order complications have higher incidence and prevalence rates than second-order complications. Among these complications hearing loss requires special attention. A conductive type of hearing loss is common in otitis media due to effusion in tympanic cavity, perforation of the tympanic membrane or ossicular changes. Inflammatory processes in middle ear can also produce sensorineural hearing loss secondary to the inflammatory processes of the middle ear.[3] Otitis media may result in some degree of hearing loss. The aim of our study to compare the hearing thresholds in different forms of otitis media.

METHODS

This cross sectional study was performed in the outpatient deparment of Patuakhali Medical College Hospital and private consultation in Central Hospital Limited. We

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Received: 01 June 2023 Revised: 15 June 2023 Accepted: 25 June 2023

divided the patients into mucosal Chronic Otitis Media (mCOM), Cholesteatomatous, Otitis Media with Effusion (OME) and Acute Otitis Media (AOM). Ears with otitis media were compared with ears of healthy individuals.

We included all patients with otitis media and patients over 18 years of age. And we excluded patients having a history of ear surgery, cancer, receiving chemotherapy or radiotherapy. A control group was selected who have bone conduction threshold<25 dB and no bone-air gap.

After proper history taking and clinical examination we performed pure tonal audiometry.. We considered hearing loss when the auditory thresholds were > 25 dB.

Statistical analysis was performed with spss. ANOVA and Spearman's correlation was used to correlate numerical variables. Values of $p < 0.05$ determined the statistical significance. The study was approved by the Ethical Review Committee of Patuakhali medical college and consent was taken from all the participants.

RESULTS

Following inclusion and exclusion criteria, we have found 110 patients and 142 ears in otitis media group. Thirty two (29%) patients were bilateral disease and 78(71%) patients were unilateral disease. Our control group had 65 patients and 130 ears, which were normal with no history of otitis media, hearing loss, ear surgery, and brain trauma.

In our 110 patients with otitis media, 58 (52.7%) were female and 52 (47.3%) were male. The control group consisted of 25 men (36.5%) and 40 women (63.5%). The ages of each group are described in Table 1.

Among our patients of otitis media, 67 (61%) had mucosal COM; 04(3.6%) patients had cholesteatoma; 21 (19%) patients had OME and 18(16.3%) patients had AOM. Regarding the number of ears, 80 ears had mucosal COM; 05 ears had cholesteatoma; 34 ears had OME and 23 ears had AOM. In addition to hearing loss most of the patients (69%) complained about tinnitus. Audiometric evaluation revealed that most patients (63%) had conductive hearing loss.

About 35% of the patients had mixed hearing loss and 1.2% had pure sensorineural hearing loss.

In the pure tone audiometry, we found worse bone thresholds in otitis media than the control in all frequencies ($p < 0.01$). (Table-3).

We also observed worse air thresholds in all ears with otitis media, when compared with the ears of the control group ($p < 0.001$), in all frequencies. (Table 4)

Table 1. Age of the patients

Age	Groups				
	mucosal Chronic Otitis Media (mCOM)	Cholesteatoma	Otitis Media with Effusion (OME)	Acute Otitis Media (AOM)	Control Gropup
Range	18–75	18–60	18–78	30–70	18–68
Mean	42	40	45	53	48

Table 2 Number of cases in different the types of hearing loss in each group.

Groups	Types of hearing loss in each group of otitis media			
	Conductive	**Mixed**	**SNHL**	**Total ears**
mucosal COM	60	20	0	80
Cholesteatoma	0	5	0	5
OME	18	16	0	34
AOM	12	10	2	23
Total	90(63.4%)	50(35.2%)	2(1.4%)	142(100%)

Table 3 Bone conduction thresholds in dB

Groups	Threshold in dB in different Frequencies			
	500Hz	1000Hz	2000Hz	4000HZ
mucosal COM	15dB	20dB	20dB	20dB
Cholesteatoma	20dB	25dB	30dB	30dB
OME	10dB	15dB	10dB	15dB
AOM	20dB	20dB	25dB	25dB
Control	5dB	5dB	10dB	5dB

Table 4 Air conduction thresholds

Groups	Threshold in dB in different Frequencies				
	500Hz	1000Hz	2000Hz	4000Hz	8000Hz
mucosal COM	30dB	35dB	35dB	40dB	45dB
Cholesteatoma	40dB	45dB	50dB	60dB	50dB
OME	35dB	40dB	35dB	40dB	40dB
AOM	35dB	40dB	45dB	45dB	40dB
Control	15dB	10dB	10dB	15dB	10dB

DISCUSSION

In our study we have found that in the diseased ear have higher bone and air conduction threshold compared to the control ear. Inflammation in the middle ear in otitis media alter the normal physiological environment. We have found all types of hearing losses conductive, mixed and sensory neural in our study. Sensory neural component is obvious when disease process involve cochlea. Inflammatory process pass beyond the middle ear boundary if it had a long course. We have found two pure sensory neural hearing losses in AOM group. Toxins in acute cases can invade round window membrane and enters directly into the cochlea causes such type of phenomenon.[5] We have a higher bone conduction threshold in OME. It may happen due to temporary threshold shift.[6]

In this study we have included only adult individuals. Pediatric patients may have

different pictures. As Children had greater variability in hearing loss the degree of asymmetry at each frequency compared to adults.[7,8] In our study we have found differences in bone conduction threshold. This may have many reasons such as ear canal pressure change. In a study it is found that the ear canal sound pressure has contribution in the mid-frequency hearing because of ear canal resonance.[9]

CONCLUSION

Findings of our study suggests that individuals with otitis media exhibit higher bone conduction thresholds compared to the control group. Further research into the mechanisms underlying this association may provide valuable insights.

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