

## **Original Article**

---

# **Degree and Pattern of Hearing impairment among patients attending in Audiology department of a tertiary level Hospital in Bangladesh**

**A.B.M. Luthful Kabir<sup>1</sup>, Shahira Sharwat Chowdhury<sup>2</sup>, Zonaid Rahim<sup>3</sup>,  
Md. Zakaria Sarker<sup>4</sup>, Manash Ranjan Chakraborty<sup>4</sup>**

### **Abstract:**

**Objectives:** To determine the degree and pattern of hearing impairment among patients attending audiology department of a tertiary level hospital.

**Methods:** This was a cross sectional observational study which was carried out in the department of audiology of National Institute of ENT(NIENT) during the period of March 2015 to June 2017. A total number of 8338 patients complaining hearing impairment were included in this study. The clinical diagnosis was established by history, detailed clinical examination including otoscopic examination and all findings were recorded. Hearing assessment was done by different hearing tests according to age and need of patient. Pure Tone Average (PTA) was done on averaging the hearing threshold at 0.5, 1 and 2 kHz.

**Results:** In this study majority of patients (30.1%) were within 25-40 years of age and most of the patients (61.27%) were male. Mild degree of hearing loss was found to have higher prevalence (40.9%) compared to other degrees of hearing losses and more than half (52.5%) of our study population had conductive hearing loss.

**Conclusion:** Mild degree of hearing impairment and conductive type of hearing impairment are more prevalent. Audiological evaluation especially in suspected hearing impaired patient should be a priority.

**Key words:** Degree and pattern of hearing impairment, Pure Tone Audiometry.

1. Research Officer, National Institute of ENT, Tejgaon, Dhaka.
2. Medical Officer, Department of Audiology, National Institute of ENT, Tejgaon, Dhaka.
3. Assistant Professor, Dept. of Audiology, National Institute of ENT, Tejgaon, Dhaka.
4. Associate Professor, National Institute of ENT, Tejgaon, Dhaka-1208.
5. Professor, Department of Audiology, National Institute of ENT, Tejgaon, Dhaka.

**Address of Correspondence:** Dr.A.B.M. Luthful Kabir. MS (Otolaryngology) Research Officer, National Institute of ENT, Tejgaon, Dhaka, Bangladesh. e-mail: l.kabir1975@gmail.com.

### **Introduction:**

Hearing- related disability is becoming an issue of increasing importance worldwide. About 2/3 population with hearing loss come from developing countries.<sup>1</sup> It causes communication problems, thus affects social and personal living. So hearing impairment amongst the people of developing countries is recognized as a major cause of disability.<sup>2</sup>

According to the report of WHO, more than 5% of the world's population has disabling hearing loss that impairs their daily life and livelihood.<sup>3</sup> The estimated number of people

with disabling hearing loss is 360 million, of which 32 million are children under 15 years of age. In Bangladesh the prevalence of hearing impairment is 9.6% (in the better hearing ear).<sup>4</sup> Similar prevalence (6.3%) also reported in India.<sup>5</sup> Other reported prevalence rates for disabling hearing loss are 6% in Maldives, 8% in both Myanmar and Srilanka and 16.6% in Nepal.<sup>6</sup>

Hearing is the function of ear which receives sound by external ear and transmits it to the cochlea of inner ear via middle ear acoustic impedance matching system. The cochlea analyzes the environmental sounds and transmits the results of analysis to brain. Any pathology in this system will cause hearing impairment which may be conductive, sensory-neural or mixed.

Hearing impairment is partial or total inability to hear. Hearing loss exists when there is diminished sensitivity to the sounds normally heard.<sup>7</sup> On the other hand disabling hearing loss refers to hearing loss greater than 40 dB in better hearing ear in adults and greater than 30 dB in better hearing ear in children.<sup>8,9</sup>

Pure tone audiometry is a simple diagnostic tool that provides valuable information regarding degree, type and helps in further management planning. It is routinely done in the department of Audiology, NIENT in those patients complaining of hearing impairment. We have done behavioural test in case of children who do not understand and execute pure tone audiometry. Electro-physiological test such as Auditory Brain Stem Response (ABR), Otoacoustic Emission (OAE), Auditory Steady State Response (ASSR) and other audiological tests are also done to find out the degree and pattern of hearing impairment.

WHO's medium term programme for deafness states that as much as 50% of the current incidence of hearing impairment could

be avoided or the consequences of the condition could be significantly reduced by early detection.<sup>10</sup> For this proper planning of programmes or interventions are required. Representative data are essential to begin such an intervention. But regarding the prevalence, grading and early detection of hearing impairment, a little information are available in Bangladesh. To date no specialized department based study is performed to find out the exact prevalence of hearing impairment or to find out the pattern and degree of hearing loss. Therefore the present study has been carried out to determine the degree and pattern of hearing impairment as well as to see the rate of hearing impairment attending in Audiology department of NIENT, a tertiary level hospital of Bangladesh.

#### **Objectives:**

1. To determine the degree and pattern of hearing impairment among patients attending in audiology department of NIENT.
2. To see the rate of hearing impairment among patients attending in out patient department(OPD) of NIENT.
3. To evaluate the efficacy of primary screening of hearing impairment by hearing test.

#### **Methods:**

**Study design:** This was a cross sectional observational study.

**Place of Study:** Department of Audiology, National institute of Ear, Nose and Throat, Tejgaon, Dhaka. **Duration of study:** 1<sup>st</sup> March, 2015 to 30<sup>th</sup> June, 2017

**Study population:** Patients complaining hearing impairment or parental/ relatives suspicion of hearing impairment attending in OPD of NIENT.

**Sample size:** 8,338

**Sampling method:** Purposive, non-random sampling.

*Inclusion criteria:*

1. Patients attending outpatient and audiology department with the complaints of hearing impairment or parents/ relatives suspicion of hearing impairment.

*Exclusion criteria:*

1. Patient attending OPD subsequently for follow up.
2. Patient having hearing impairment with acute and active ear problem.
3. Patients not interested to enrol in the study.

**Methods:**

The clinical diagnosis was established by history, detailed clinical examination including otoscopic examination after taking a verbal informed consent from patient or legal guardian and all findings were recorded. All hearing test were done in acoustically treated room (20 dB ambient noise) of NIENT by well-trained audiometrician. Pure tone average (PTA) was done on averaging the hearing threshold at 0.5, 1 and 2kHz with reference to ISO:R 389-1970.

**Instrument and equipment included:**

1. Free field audiometer : Model PA5
2. Clinical audiometer : Model R37A
3. Tympanometer : Model R36M
4. Brain stem evoked response audiometer : Model Epic plus
5. Oto acoustic emission analyzer : Model Echolab
6. ASSR: Model Epic Plus.
7. Sound level meter: Model Larson Davis.
8. Otoscope : Model Heine

**Data collection technique:** Relevant data was collected by a pre-tested, structured questionnaire by a face to face interview. Collected data were coded in the questionnaire. Data in the questionnaire were entered into the computer using SPSS software.

**Data analysis:** All collected data were checked and verified thoroughly to reduce inconsistency. Categorical variables were presented in the form of frequency and percentage and quantitative data was presented in the form of mean and standard deviation.

**Hearing test for different age group:**

From birth to 6 months	ABR, OAE, ASSR
6 months to 3years	Behaviour observation audiometry
>3 years to 5 years	Conditioned play audiometry, OAE, ABR, ASSR.
>5 years	Pure tone audiometry, Tympanometry, SRT
Difficult to test patient or hard to believe audiogram with conventional audiometry.	ABR, OAE, ASSR

**Operational definitions:**

- Hearing impairment:** In line with WHO classification hearing impairment was defined according to pure tone average in better hearing ear. The hearing threshold level was calculated as average of three frequencies: 0.5, 1, 2 kHz. A patient with a hearing loss of >25 dB (better ear response) was regarded as hearing impaired.
- Grading of hearing impairment:** ( by WHO)<sup>11</sup>

No.	Impairment grade	Audiometric value
1.	Profound hearing impairment	>91dB
2.	Severe hearing impairment	71- 91 dB
3.	Moderately severe hearing impairment	56-70 dB
4.	Moderate hearing impairment	41-55 dB
5.	Mild hearing impairment	26-40 dB

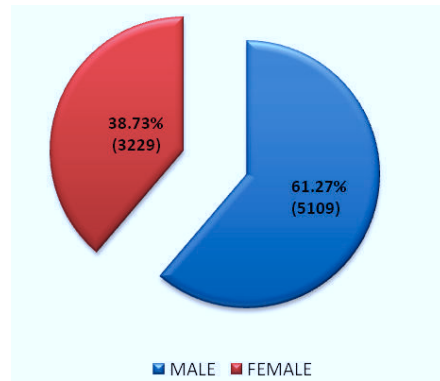
**Observation and Results:**

**Table I**  
*Distribution of the study patients by age (n=8338)*

Age (years)	No. of patients(n)	Percentage (%)
0-05	395	4.7%
>05-15	950	11.4%
>15-25	1602	19.2%
>25-40	2509	30.1%
>40-50	1150	13.8%
>50-60	863	10.4%
>60	869	10.4%
<b>Total</b>	<b>8338</b>	<b>100%</b>

Most of patient belonged to age >25-40 years.

**Table II**  
*Distribution of the study patients by sex (n=8338)*



**Table III**  
*Distribution of audiological test*

TEST		n	%
PTA, Impedance, ART	PTA + Tympanometry + ART	7496	95.3%
	PTA (only)	382	
	Tympanometry + ART (only)	66	
Behavioral test	BOA+VRA+Play audimetry+ FFA	215	2.6%
Electrophysiological test	ABR	76	1.96%
	ASSR	24	
	OAE	64	
Other test	SISI, ABLB, TD, MCL, UCL	15	0.18%
<b>Total</b>		<b>8338</b>	<b>100%</b>

PTA + Tympanometry + ART were used in most cases.

**Table IV**  
Grading of hearing loss (as per WHO)  
(n=8338)

Grading of HL	n	%
Normal	1685	20.2%
Mild HL	3414	40.9 %
Moderate HL	1201	14.4%
Moderately severe HL	633	7.6%
Severe HL	811	9.7%
Profound HL	449	5.4%
Grading not possible	145	1.7 %
Total	8338	100%

Mild degree of hearing loss had higher prevalence

**Table V**  
Types of hearing loss (n=6653)

Types	n	%
Conductive HL	3493	52.5%
Mixed HL	1350	20.3%
SNHL	1665	25.0%
Unclassified	145	2.2%
Total	6653	100%

More than half of study population had conductive hearing loss.

**Table-VI**  
Rate of hearing impairment:

Total no. of patient attended in OPD	Patient referred for audiological test		Patient having hearing impairment		
	Number of patient	Percentage	Number of patient	Rate of hearing impairment (among referred patient)	Rate of hearing impairment (among total patient)
1,80,087	8338	4.63%	6653	79.8%	3.69%

Most of patients referred from OPD had actual hearing impairment and the rate of hearing impairment was 3.69%.

#### Discussion:

This cross sectional study was carried out with an aim to see the pattern and degree of hearing impairment among patients attending in audiology department. The study findings were discussed and compared with previously published relevant studies.

In this study most of patient belonged to age group >25-40 and it was 30.1%. Next common age group was >15-25 and 19.2% patient belonged to this group, followed by 40-50 years of age was 13.8%, 5-15 years of age was 11.4% and 50-60, >60, 0-5 years of

age groups were 10.4%,10.4% and 4.7% respectively. In another study carried out in Bangladesh was showed that most commonly (22.2%) affected age group was 15-29 years of age and next group was 30-44 years age group (21.9%)which was more or less similar to our study.<sup>12</sup>

Usually occurrence of hearing impairment has no influence of any sex variation. Our study showed male sex was predominant (61.27%) which was in close agreement with another study where male and female were 56.87% and 43.13% respectively.<sup>13</sup> Pure tone

audiometry and tympanometry are simple tool and easy to perform to diagnose hearing impairment. It was used in 95.3% cases in this study.

In our study population, mild degree of hearing loss were found to be the highest prevalence (40.9%). Furthermore moderate (14.4%) and severe (9.7%) were the second and third highly observed severity of hearing loss. Similar observation was found with higher prevalence of mild hearing loss in some other studies.<sup>14,15</sup> Moderate degree of hearing loss (27.31%) was found to have higher prevalence in another study.<sup>13</sup>

More than half (52.5%) of our study population had conductive hearing loss, followed by SNHL (25.0%) and mixed hearing loss (20.3%). This was very much close to the result of another study where conductive hearing loss, SNHL and mixed hearing loss were found 50%, 20% and 30% respectively.<sup>16</sup> 2.2% of our study population couldn't be classified due to difficulty in testing to assess hearing threshold.

In this present study it was observed that 4.63% patient was referred for audiological test for hearing impairment among which 3.69% had actual hearing impairment. It indicates primary screening for hearing impairment was almost properly done. Primary screening is an efficient mode of health care delivery and it is both economical as well as time saving. This study revealed only 3.69% patients attending in OPD had actual hearing impairment. But in Bangladesh the prevalence of hearing impairment is 9.6% (in the better hearing ear)<sup>12</sup>. This data is generated by a hospital based statistics. So, it is not representative of real statistics of hearing impairment of the country.

#### Conclusion:

The present study documented that the commonest type of hearing loss is conductive type and commonest degree of hearing loss

is mild degree (26-40 dB). Our study clarified that audiological evaluation is crucial for diagnosis of hearing impairment. As most of causes of hearing loss are preventable, early diagnosis and management can improve the situation.

#### References:

1. Islam M, Islam R, Bhuiyan M, Rashid S, And Datta P, Pattern And Degree Of Hearing Loss In Chronic Suppurative Otitis Media, *Bangladesh Journal of Otorhinolaryngology*. 16(2), 2010,96-105.
2. Wilson J. Hearing impairment in developing countries. *J. Otolaryngol*, 1990; 19:368-371.
3. WHO global estimates on prevalence of hearing loss. In:[http://www.who.int/pbd/deafness/WHO\\_GE\\_HL.pdf](http://www.who.int/pbd/deafness/WHO_GE_HL.pdf) [21February,2014]
4. Amin MN. Prevalence of hearing loss in Bangladesh [Report submitted to WHO Country office for Bangladesh]. Dhaka, December 2002.
5. Garg S, Chadha S, Malhotra S, Agarwal AK. Deafness: burden, prevention and control in India. *Natl Med J India* 2009; 22:79-81
6. World Health Organization. *Situation Review and Update on Deafness, Hearing loss and Invention Programmes*. New Delhi: WHO SEARO, 2007
7. Elzouki, Abdelaziz Y (2012) *Text book of clinical paediatrics* (2<sup>nd</sup>ed.) Berlin: springer P.602]
8. <http://www.who.int/mediacentre/factsheets/fs300/en>.
9. Olusanya BO, Neumann KJ, Saunders JE, et al. The global burden of disabling hearing impairment: a call to action. *Bull World Health Organ* 2014; 92(5):367-373.

10. World Health Organization. Eight general programme of work covering the period 1990-95. May;1987
11. World Health Organization. International classification of impairment, disabilities, and handicaps. Geneva. World Health Organization. 1980; 73-78.
12. Tarafder KH, Akhtar N, Zaman MM, Rasel MA, Bhuiyan MR, Datta PG. Disabling hearing impairment in Bangladeshi population. *The Journal of Laryngol & otology*. 2015, 129, 126-135.
13. Ravi D, Prasad HM, Laksmi MS, Sahana P. A tertiary care hospital-based retrospective study evaluating age and gender differences in audiological findings. *J. Evolution Med.Dent.Sci*. 2017; 6(21):1678-1682.
14. Rabbani SMG, Chowdhury MA, Shumon AM, Yasmeen N, Rashid M, Nuruzzaman M, Ahmed N. pattern and causes of hearing loss among the patients attending in an ENT OPD. *AKMMC J* 2014;5(2):9-13
15. Browning GG, Gatehouse S. The prevalence of middle ear disease in adult british population. *Clinical Otolaryngology* 1992;17:317-21
16. Musani MA, Khan FA, Raur A, Ahsan M. frequency and causes of hearing impairment in a tertiary care center. *JPMA* 2011;61:141.