

Manual Audiometry: A Tool for Assessing Hearing Difficulty

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ABSTRACT

Background: Hearing is essential for the development of language, speech and cognitive skills. The neurological development of hearing abilities requires an acoustic stimulation in the first two year of life. The different methods are available for assessment of hearing loss in different age group.

Methods: The prospective study was conducted from January 2014 to March 2015, which included 575 patients in Department of Otorhinolaryngology, Katihar Medical College, Bihar, a tertiary care teaching hospital. Those patients who were presenting with diminished hearing loss and ear symptoms were enrolled in study.

Results: All patients (575) had ear diseases and 57 (10%) patients were found having normal hearing. Male (320) patients suffered more hearing loss than female patients (255) 55.65% and 44.34% respectively. Ear diseases and hearing loss involved commonly in bilateral ear (58.49%).

Conclusion: Our study revealed that 94% patients had hearing impairment of self-reported hearing loss. Conductive type of hearing loss is the most common type of hearing impairment.

KEYWORDS: Hearing, Audiometry, Hearing Loss.

INTRODUCTION

More than 360 million people have disabling hearing loss in worldwide and its 5.3% of the world population. More than 63 million people are suffering from auditory impairment in India as per WHO. This is an estimated prevalence of 6.3% in Indian population.¹

Hearing is essential for the development of language, speech and cognitive skills. The neurological development of hearing abilities requires an acoustic stimulation in the first two year of life. The different methods are available for assessment of hearing loss in different age group likes behavioral observation audiometry (BOA), conditioning techniques, pure tone audiometry (PTA), speech audiometry, impedance audiometry, otoacoustic emissions (OAE) and brainstem evoked response audiometry (BERA)/ auditory brainstem response (ABR).^{2,3}

The point of the present work is to decide the etiological component, sort and seriousness of hearing misfortune in country group by fundamental audiometry test. We have likewise endeavored endeavors for the early recognition and treatment of hearing misfortune by surgical amendment, recovery and alluded to higher place for cochlear implantation.

MATERIALS AND METHODS

The prospective study was conducted from January 2014 to March 2015, which included 575 patients in Department of Otorhinolaryngology, Katihar Medical College, Bihar, a tertiary care teaching hospital. Those patients who were presenting with diminished hearing loss and ear symptoms were enrolled in study. The total Clinical examination, Otoscopic, and tuning forks test were done in all patients. Hearing evaluations were finished by manual immaculate tone audiometry for all patients. Those patients who experienced outer ear ailments like inherent infections (waterway stenosis with or without microtia), wax, Otomycosis, Furunculosis, Otitis externa and Harm of outside and center ear are prohibited from study and oversaw by therapeutic, suction and cleaning, consolations and alluded to cochlear embedded focus. Nature and counteractive action of ear illnesses were disclosed to all patients in country group.

RESULTS

All patients (575) had ear diseases and 57 (10%) patients were found having normal hearing. Male (320) patients suffered more hearing loss than female patients (255).

Ear diseases and hearing loss involved commonly in bilateral ear (58.49%). The youngest group consisted of 155 patients (26.95%) between twenty one to thirty years of age. Conductive type of hearing loss is the most common type hearing impairment and it's about 62.60% (360). 350 (60.8%) patients had mild degree of conductive hearing loss. (Table-2)

Sensorineural hearing loss were the second most type of hearing impairment in community and its 75 case assisted by audiometry and had moderate to severe degree of (27%) hearing loss. (Table-4)

54 (9.44%) patients were found having mixed type of hearing loss in which 30 (55.55%) had moderate to severe degree of hearing loss.

Table 1: Age Related Hearing Loss: n=575 patients

AGE IN YEARS	NO. OF PATIENTS	PERCENTAGE (%)
6-10	15	2
11-20	95	16.5
21-30	155	26.95
31-40	125	21.73
41-50	75	13
51-60	60	11
MORE THAN 60	50	9

Table 2: Degree of Hearing Loss (Conductive Hearing Loss)

DEGREE OF HEARING LOSS	NO. OF PATIENTS	PERCENTAGE
NORMAL (BELOW 25dB)	57	9.2%
MILD (26-40dB)	350	60%
MODERATE(41-55dB)	75	16.2%
MODERATE TO SEVERE (56-70dB)	66	12.1%
SEVERE(71-90dB)	3	1.5%
PROFOUND (MORE THAN 90dB)	2	1%

Table 3: Conductive Hearing Loss

EAR AFFECTED	NO. OF PATIENTS
RIGHT EAR	95
LEFT EAR	113
BILATERAL EAR	160

Table 4: Degree of Hearing Loss (Sensorineural Hearing Loss)

DEGRE OF HEARING LOSS	NO. OF PATIENTS	PERCENTAGE
NORMAL (BELOW 25dB)	NIL	0%
MILD (26-40dB)	25	16.7%
MODERATE(41-55dB)	25	16.7%
MODERATE TO SEVERE(56-70dB)	40	26.6%
SEVERE(70-90dB)	30	20%
PROFOUND (MORE THAN 90dB)	30	20%

Table 5: Sensorineural Hearing Loss

EAR AFFECTED	NO. OF PATIENTS
RIGHT EAR	20
LEFT EAR	28
BI LATERAL EAR	103

Table 6: Mixed Hearing Loss

DEGRE OF HEARING LOSS	NO. OF PATIENTS	PERCENTAGE
MILD (26-40dB)	04	7.4%
MODERATE(41-55dB)	5	9.3%
MODERATE TO SEVERE(56-70dB)	30	55.5%
SEVERE(70-90dB)	10	18.5%
PROFOUND (MORE THAN 90dB)	5	9.3%

Table 7: Mixed Hearing Loss

EAR AFFECTED	NO. OF PATIENTS
RIGHT EAR	6
LEFT EAR	5
BILATERAL EARS	43

DISCUSSION

In the world there is a wide variation in the incidence and prevalence of childhood hearing loss. The prevalence of hearing impairment was 5.7% in Gwarzo, LGA, and Nigeria.^{4,5} The prevalence of hearing impairment was 1.2% in children below 15 years and 4.5% in adults out of 5.7%. In India, there is 6.3% prevalence of hearing impairment.⁶ There is a wide variation in the etiology of childhood deafness in different part of world. In India, more than 18,000 deaf children are added in our population every year.

There are distinctive strategies that are accessible for evaluation of hearing in various age bunches, yet are dependably a test for youngsters. In writing, clinical tests like Finger Grating test, Watch test, Discourse (voice) test and Tunic Fork test are utilized for appraisal of hearing.

Unadulterated Tone Audiometry, Discourse Audiometry, Bekesy Audiometry and Impedance Audiometry tests are the Audiometric assessment for hearing. Otoacoustic Outflows (OAEs) and Sound-related Cerebrum Stem Reaction (ABR) are utilized to survey new borns' listening ability.

Some studies had attempted to show the unreliability of Tuning Fork Test for general screening, but this study showed that the Tuning Fork Test (all tree frequinces-256,512 and 1024Hz) has considerable accuracy and sensitive. Tuning Fork Tests were used successfully as a quick assessment test in hearing acuity in OPD.⁷

Pure tone audiometer is an electronic device which is used to assess hearing of children from 4 year olds to adults. Pure Tone Audiometry (Audiogram) is simple and most widely available subjective technical investigation of hearing assessment. This test is very reliable if the patient is cooperative. Pure tone audiometry involves estimating the threshold of hearing for certain standardized stimuli, usually air-conduction and bone-conduction. Pure Tone Audiometer measures tone for 250, 500, 1000, 2000, 4000 and 8000Hz thresholds in air conduction and bone conduction in present study. An air-conduction threshold measures the acuity of the entire hearing system. Its help to determine the type and the severity of the hearing loss. Bone-conduction thresholds provide auditory threshold information when the cochlea is stimulated. The bone conducted sound measurements may have simplified as three routes by Tonndorf (1972).

1. The direct osseous route.
2. The route passing from the skull to the middle ear and hence to the cochlea via the ossicles and the air of the middle ear cavity.
3. The route passing from the skull to the ear canal and middle ear.

The relationship between air-conduction and bone-conduction thresholds is used to determine the type of hearing loss. The graphic representation of the categories of hearing loss are shown in the below table.

NORMAL HEARING	(0 dB-25 dB)
MILD	(26 dB-40 dB)
MODERATE	(41 dB-55 dB)
MODERATELY SEVERE	(56 dB-70 dB)
SEVERE	(71 dB-90 dB)
PROFOUND	(MORE THAN 90 dB)

CONCLUSION

Our study revealed that 94% patients had hearing impairment of self-reported hearing loss. Conductive type of hearing loss is the most common type of hearing impairment. Chronic Otitis Media is the most common cause of hearing impairment.

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