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RESEARCH ARTICLE

EAR DISEASES PATTERN AND HEARING ASSESSMENT IN THE RURAL COMMUNITY BY MANUAL AUDIOMETRY

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ABSTRACT

Objective: The aim of the present study and work is to determine the ear diseases pattern, etiological factor, type and severity of hearing loss in rural community by manual pure tone audiometry. We have also made efforts for the early detection and treatment of hearing loss by surgical correction, rehabilitation and referred to higher center for cochlear implantation.

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. India is a developing country. It is ridden with illiteracy, poverty and sociopolitical problem. Chronic suppurative otitis media (CSOM) is one of the most common ear diseases in South East Asia having a prevalence of 5.2% in the general population but in India is 4.75%. Chronic Suppurative Otitis Media (CSOM) is one of the most common childhood infectious diseases worldwide. It is most common causes of hearing impairment. It is estimated that there are 31 million new cases of CSOM per year in worldwide. 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).

Material and Methods: The prospective study was conducted from January 2011 to January 2012, which included 1144 patients in Gold fields Institute of Medical Sciences, Faridabad, Haryana. Those patients who were presenting with diminished hearing loss and ear symptoms were enrolled in study. The complete Clinical examination, Otoscopic, tuning forks test, and radiological evaluation were done in all patients. Hearing assessments were done by manual pure tone audiometry for all patients. Those patients who suffered from wax, otomycosis, furnculosis,suspicious malignancy of external and middle ear are excluded from study. All patients were managed by medical, surgical, suction and cleaning, reassurances and referred to cochlear implanted center. Nature and prevention of ear diseases were explained to all patients in rural community.

Results: All patients (1144) had ear diseases and 68 (5.94%) patients were found having normal hearing. Male (719) patients suffered more hearing loss than female patients (425) 62.85% and 37.15%respectively. Ear diseases and hearing loss involved commonly in bilateral ear (53.49%). The youngest group consisted two hundred ninety eight patients (26%) between twenty one to thirty years of age.

Interventions: A total 1144 patients between the age of 6 years to 94 years were self reported hearing difficulty assess by manual pure tone audiometer (arphi model). Hearing assessment measured by Audiometer in different frequency at 250, 500, 1000, 2000, 4000, and 8000Hz.

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 in rural community and it's about 64% (736) which is treatable if the pattern of diseases and degree of hearing loss is evaluated early. Chronic Otitis Media is the most common cause of hearing impairment. Conductive type of hearing loss is the most common type of hearing impairment and it's about 64% (736).Chronic Otitis Media (more than 57%) is one of the most common disease found in our study.

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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. India is a developing country. It is ridden with illiteracy, poverty and sociopolitical problem. Chronic suppurative otitis media (CSOM) is one of the most common ear diseases in South East Asia having a prevalence of 5.2% in the general population but in India is 4.75%. 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). The aim of the present study and work is to determine the ear diseases pattern, etiological factor, type and severity of hearing loss in rural community by basic pure tone audiometry test. We have also made efforts for the early detection and treatment of hearing loss by surgical correction, rehabilitation and referred to higher center for cochlear implantation.

MATERIAL AND METHODS

The prospective study was conducted from January 2011 to January 2012, which included 1144 patients in Gold fields Institute of Medical Sciences, Faridabad, Haryana. Those patients who were presenting with diminished hearing loss and ear symptoms were enrolled in study. The complete Clinical examination, Otoscopic, tuning forks test, and radiological evaluation were done in all patients. Hearing assessments were done by manual pure tone audiometry for all patients. Those patients who suffered from Wax, Furunculosis, Otomycosis and suspicious malignancy of external and middle ear are excluded from study. All patients were managed by medical, surgical, suction and cleaning, reassurances and referred to cochlear implanted center. Nature and prevention of ear diseases were explained to all patients in rural community.

RESULTS

All patients (1144) had ear diseases and 68 (5.94%) patients were found having normal hearing. Male (719) patients suffered more hearing loss than female patients (425) 62.85% and 37.15%respectively. Ear diseases and hearing loss involved commonly in bilateral ear (53.49%). The youngest group consisted two hundred ninety eight patients (26%) between twenty one to thirty years of age (table 1). Chronic Suppurative Otitis Media (CSOM) of mucosal type is most common pathology found and it's patients are 582 (50.87%). Age related hearimg loss-Presbyacusis (21.68%) the second causes of hearing impairement. Chronic Otitis Media sequamus type was found in 76 (6.65%). The commonest pathology found was chronic otitis media with mucosal type diseases in 582 (50.87%) patients. Presbycusis (21.68%) is the second common pathology and needed hearing aids. Chronic otitis media with seqamus (atticoantral) in 6.65%, Tubal catarrh in 5.94 %, Otitis media with effusion in 4.55%, and Acute suppurative otitis media were other pathologies._Nine patients (0.79%) were found to be deaf mute and those patients referred to cochlear implant center for treatment and rehabilitation. Thirty (2.63%) cases of suspected Sonsorineural (other cause) hearing loss were identified.

Table 1. Age related hearing loss

Age in years	No. of patients	Percentage (%)
6-10	54	5
11-20	206	18
21-30	298	26
31-40	199	17
41-50	135	12
51-60	120	10
MORE THAN 60	132	12

Table 2. Ear Diseases pattern

Diagnosis	Male	Female	Total	Percentage
Csom-ttd	320	262	582	50.87
Presbycusis	150	98	248	21.68
Csom-aad	46	30	76	6.65
Tubal catarrh	41	27	68	5.94
Otits media effusion	32	20	52	4.55
Asom	28	20	48	4.20
Deaf mute	5	4	09	0.79
Snhl	10	20	30	2.62
Otosclrosis	4	10	14	1.22
Traumatic perforation	4	6	10	0.87
Foreign body ear	2	2	4	0.35
Earcanal stenosis and microtia	1	2	3	0.26
Total	647	497	1144	100
Percentage	56.56	43.44	100	100

Conductive Hearing Loss: Conductive type of hearing loss is the most common type hearing impairment and it's about 64% (736). Four hundred forty (60%) patients had mild degree of conductive hearing loss (Table 3).

Table 3. Conductive hearing loss

Degree of hearing loss	No. of patients	Percentage
Normal (below 25db)	68	9.2%
Mild (26-40db)	440	60%
Moderate (41-55db)	120	16.2%
Moderate to severe (56-70db)	90	12.1%
Severe (71-90db)	10	1.5%
Profound (more than 90db)	O8	1%

Conductive hearing loss

Ear affected	No. Of patients
Right ear	190
Left ear	226
Bilateral ear	320

Sensorineural Hearing Loss

Sensorineural hearing loss were the second most type of hearing impairment in community and its 300 (26%) case assisted by audiometry and had moderate to severe degree of (27%) hearing loss (Table 4).

Table 4. Sensorineural hearing loss

Degre of hearing loss	No. Of patients	Percentage
Normal (below 25db)	Nil	0%
Mild (26-40db)	50	16.7%
Moderate (41-55db)	50	16.7%
Moderate to severe (56-70db)	80	26.6%
Severe (70-90db)	60	20%
Profound (more than 90db)	60	20%

Sensorineural Hearing Loss

Ear affected	NO. OF Patients
Right ear	40
Left ear	54
Bi lateral ear	206

Mixed Hearing Loss

One hundred eight (9.44%) patients were found having mixed type of hearing loss in which sixty patients (55.55%) had moderate to severe degree of hearing loss (Table 4).

Table 5. Mixed Hearing Loss

Degree of hearing loss	No. of patients	Percentage
Mild (26-40db)	08	7.4%
Moderate (41-55db)	10	9.3%
Moderate to severe (56-70db)	60	55.5%
Severe (70-90db)	20	18.5%
Profound (more than 90db)	10	9.3%

Mixed hearing loss

Ear affected	No. Of patients
Right ear	12
Left ear	10
Bilateral ears	86

DISCUSSION

Chronic Suppurative Otitis Media (CSOM) is one of the most common childhood infectious diseases worldwide. It is most common causes of hearing impairment. It is estimated that there are 31 million new cases of CSOM per year in worldwide. 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. 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. Otitis Media is one of the most common diseases in young children and adult. Low socioeconomic status, poor nutrition, incomplete immunization and unhygienic living conditions could be responsible for this susceptibility to otitis media and various ear infection. Warm and humid weather also precipitate to various ear infections. Our study show chronic otitis media (more than 57%) is the commonest causes of hearing loss. Middle age group (21-30yrs.) are most common affected by chronic otitis media and which manage by surgical. Presbycusisis the second most causes of hearing loss and treated by hearing aids. There are different methods that are available for assessment of hearing in different age groups, but are always a challenge for children.

In literature, clinical tests like Finger Friction test, Watch test, Speech (voice) test and Tunic Fork test are used for assessment of hearing. Pure Tone Audiometry, Speech Audiometry, Bekesy Audiometry and Impedance Audiometry tests are the Audiometric evaluation for hearing. Otoacoustic Emissions (OAEs) and Auditory Brain Stem Response (ABR) are used to assess new borns' hearing. 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. 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).

- The direct osseous route.
- 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.
- 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.

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 and it's about 64% (736).
- Chronic Otitis Media with mucosal disease is the most common cause of hearing impairment.
- Chronic Otitis Media (more than 57%) is one of the most common disease found in our study.

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