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A Study on Clinical Profile of Children Below 5 Year Age Group with Hearing Impairment

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ABSTRACT

Children with hearing impairment often experience delayed development of speech and cognitive skills, which may result in slower learning and difficulty in progressing at school. Children may suffer from social stigmatization and isolation as a result of hearing impairment. The impact of hearing impairment on child's speech, language, education and social integration depends on the level and type of hearing impairment and the age of onset, especially if it begins before the age when speech normally develops. Children below 5 years of age consulting or referred to ENT OPD and Pediatric neurology OPD who fulfill the inclusion criteria of study are included after taking informed consent. 11 cases (11%) of the cases showed bilateral microtia out of which 9 cases (9%) showed stenosis of external auditory canal and tympanic membrane was not visualized due to stenosis in 4 cases (4%) of cases in right ear and 3 cases (3%) in left ear. 2 of the cases showed right sided facial weakness. Tympanic membrane perforation was seen in 3 cases (3%) of right ear and 1 case (1%) of left ear.

INTRODUCTION

Hearing impairment acquires a special significance in children as a large percentage of populations affected are children. As per WHO estimate in 1995 there were at least 120 million people in the world with disabling hearing impairment, with a global prevalence of 2.1%^[1,2]. Of this 78 million people were in developing countries, of which approximately 8 million were children and adolescents aged under 18 years. In the South-East Asian Regions, 25 millions were estimated to be having disabling hearing impairment, 2.5 million of which were children and adolescents below the age of 18 years^[3]. WHO estimates show that the number of people with disabling hearing impairment has more than doubled since then to at least 278 million in the year 2005. Two-thirds of people with hearing impairment worldwide live in developing countries. But the effects of the hearing loss are often overlooked and have not received proper attention, public-health funding and services, that it deserves^[4]. At present, hearing impairment in adults is included in the list of diseases that contribute to disability and mortality as an important component in the global burden of diseases, but childhood hearing impairment is not. This discrepancy is especially incongruous in light of the now common view that early detection of hearing loss in babies and children is cost effective and increases quality of life^[5]. Hearing impairment refers to partial or complete loss of the ability to hear from one or both ears. There are different levels of hearing impairment. The degrees of impairment can be mild, moderate, severe or profound^[4]. Children with hearing impairment often experience delayed development of speech and cognitive skills, which may result in slower learning and difficulty in progressing at school. Children may suffer from social stigmatization and isolation as a result of hearing impairment. The impact of hearing impairment on child's speech, language, education and social integration depends on the level and type of hearing impairment and the age of onset, especially if it begins before the age when speech normally develops^[4]. The interventions to reduce development of communication disabilities with hearing impairments are most successful if affected children are diagnosed early^[6]. Screening of newborn hearing is routine in many developed countries. The World Health Organization (WHO) suggests that in developing countries, children should be screened at school entry using a simple audiometer and that the external ear be inspected for the presence of discharge to study the extent of problem in the community^[7]. Information obtained from sporadic studies done in the past indicates the prevalence of hearing impairment among Indian primary school children is in the range of 5.4 to 21.63%. These studies have highlighted the fact that such hearing impairment is predominantly conductive in nature and thus, largely preventable^[8].

MATERIALS AND METHODS

Study Design: Cross-sectional study.

Method of Data Collection: Children below 5 years of age consulting or referred to ENT OPD and Pediatric neurology OPD who fulfill the inclusion criteria of study are included after taking informed consent.

Sampling Procedure: All children fulfilling inclusion criteria, with informed consent from parents/guardian were enrolled in this present study.

Sample Size: Various studies showed the prevalence of hearing impairment in children as 60%.

$$n=4pq/d^2$$

Where,

n=Sample size.

p=60. i.e. Prevalence.

q=100-P. i.e. 40.

d=Absolute error, 10.

So,

$$n=4 \times 60 \times 40 \div 10^2.$$

n=96. Sample size will be 96.

Taking into consideration the estimated sample size of 96 and the inclusion criteria, all children ranging from zero to five years of age consulting in ENT and Pediatric neurology OPD were recruited as study participants. Thus, a total of 100 children were included in this study and hence 200 ears were evaluated.

Study Hypothesis: Hearing impairment are common among children which could be conductive or sensorineural in nature. Prevalence of hearing impairment and hearing sensitivity among children will help us to know the burden of disability among children of below 5 years of age group, hence early diagnosis and rehabilitative procedure can be started early which will help in speech and language development.

Selection Criteria:

Inclusion Criteria: Children of under five years of age with.

- Delay or no speech and language development.
- Inconsistent response to sound or inability to respond to sound.
- History of high risk factors.
- Deafness in the family.
- Consanguineous marriage in parents.
- Difficult/obstructed labor.
- Prematurity/low birth weight in infants.
- Administration of ototoxic drugs like amino glycosides either in mother during pregnancy or in the child.
- Maternal infections like toxoplasmosis, rubella, cytomegalo virus, herpes.
- Children with ear malformations/infection.

- Children brought with concern of parents about hearing sensitivity, learning disability noticed in school/craniofacial malformations.

Exclusion Criteria:

- Children above 5 years of age.
- Cases refusing to give consent were excluded from our study.

RESULTS AND DISCUSSIONS

Table 1: Presenting Complaints

History	Distribution (n=100)	
	Number	Percentage
Delayed/No development of speech	53	53%
No/inconsistent response to sound	69	69%
Ear malformation	11	11%

Cases with inconsistent or no response to sound were 69 cases (69%), delayed or no development of speech were 53 cases (53%) indicating these were the commonest complaints and cases with ear malformations were 11 cases (11%). There were no cases with other complaints like learning disability or craniofacial malformations.

Table 2: Ear Examination-Pinna

Findings	Right ear (n=100)		Left ear (n=100)	
	Number	Percentage	Number	Percentage
Normal	89	89%	89	89%
Microtia	11	11%	11	11%
Total	100		100	

Table 3: Ear Examination-External Auditory Canal

Findings	Right ear (n=100)		Left ear (n=100)	
	Number	Percentage	Number	Percentage
Normal	91	91%	91	91%
Stenosis	9	9%	9	9%
Total	100		100	

Table 4: Ear Examination-Tympanic Membrane

Findings	Right ear (n=100)		Left ear (n=100)	
	Number	Percentage	Number	Percentage
Normal	93	93%	96	96%
Not visualized (due to canal stenosis)	4	4%	3	3%
Perforation	3	3%	1	1%
Total	100		100	

11 cases (11%) of the cases showed bilateral microtia out of which 9 cases (9%) showed stenosis of external auditory canal and tympanic membrane was not visualized due to stenosis in 4 cases (4%) of cases in right ear and 3 cases (3%) in left ear. 2 of the cases showed right sided facial weakness. Tympanic membrane perforation was seen in 3 cases (3%) of right ear and 1 case (1%) of left ear.

Table 5: Bera Results

Findings	Right ear (n=100)		Left ear (n=100)	
	Number	Percentage	Number	Percentage
Normal	36	36%	30	30%
AL	2	2%	4	4%
AT	20	20%	11	11%
AT and AL	18	18%	26	26%
Absent waves and AT>120dB	24	24%	29	29%
Total	100		100	

Normal Results: Normal BERA findings were noted among 36 cases (36%) in the right ear and 30 (30%) in left ear.

Abnormal Latency (AL): Abnormal latency was found among 2 cases (2 %) in right ear and 4 cases (4%) in left ear.

Abnormal Threshold (AT): Abnormal threshold was noted among 20 cases (20%) in right ear and 11 cases (11%) in left ear.

Both Abnormal Threshold and Latency (AT and AL): Were found in 18 cases (18%) of cases in right ear and 26 cases (26%) in left ear.

Absent Waves or Threshold Values >120 dB i.e. Profound Hearing Loss: 24 cases (24%) of cases in right ear and 29 cases (29%) in left ear.

In the present study, cases with inconsistent or no response to sound were seen in 69 (69%), delayed or no development of speech were in 53 (53%) and cases with ear malformations were 11 (11%). There were no cases with other complaints like learning disability, cases brought with the complaints of craniofacial malformations. Children with hearing impairment often experience delayed development of speech and cognitive skills, which may result in slower learning and the impact of hearing impairment on child's speech, language, education and social integration depends on the level and type of hearing impairment and the age of onset, especially if it begins before the age when speech normally develops^[4]. This was comparable with the study conducted by K. K. Desarda, which comprised age group of under five years^[9].

BERA Results: Normal results were found in 36 cases (36%) in the right ear and 30 cases (30%) in left ear. Abnormal latency was found in 2 cases (2%) in right ear, 4 (4%) in left ear. Abnormal threshold was found in 20 cases (20%) in right ear and 11 (11%) in left ear. Both abnormal threshold and latency observed in 18 cases (18%) in right ear and 26 cases (26%) in left ear. Absent waves or threshold values more than 120 dB: observed in 24 cases (24%) in right ear and 29 cases (29%) in left ear. In the present study normal threshold in our setup was taken as threshold values <or equal to 50 dB which are eliciting all the waveforms (Wave I to Wave V) which are having proper morphology. Threshold values >normalcy were taken as abnormal threshold for hearing, having some form of hearing impairment^[10]. The mean absolute latencies of each wave were taken. The mean normal absolute latencies of Wave I is 1.75 msec, Wave II is 2.8 msec, Wave III is 3.9 msec, Wave IV is 5.1 msec, Wave V is 5.7 msec. The interpeak latency of waves I-III is 2.1 msec, I-V is 4.0 msec.

For the practical convenience, wave I, Wave III, Wave V and interpeak latencies of waves I-III, I-V were taken which is more relevant than Wave II and Wave IV.

CONCLUSION

- Commonest complaint was delayed or no development of speech and inconsistent or no response to sound.
- The most common ear malformation was bilateral microtia accounting for 11%.
- BERA was abnormal in 64 cases (64%) in right ear and 70 cases (70%) in left ear.

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