

Original Research Article

Prevalence and etiological factor of hearing impairment among school going children in rural area of district, Dehradun

Saurabh Saini, S. S. Bist*, Lovneesh Kumar

Department of ENT, Himalayan Institute of Medical Science, Swami Rama Himalayan University, Jollygrant, Dehradun, Uttarakhand, India

Received: 25 November 2019

Revised: 17 January 2020

Accepted: 18 January 2020

***Correspondence:**

Dr. S. S. Bist,

E-mail: sss843026@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Childhood hearing impairment is a significant public health condition associated with long-term academic and communicative difficulties. Causes can be congenital or acquired. Nearly half of the known causes can be prevented by primary public health methods. Present study was conducted to determine the prevalence and etiological factor related to hearing impairment among school going children in rural area district Dehradun.

Methods: 1003 children, aged 6 to 17 years, from the schools in the Doiwala block district Dehradun were randomly selected and examined. Clinical otologic assessment and Pure tone audiometry screening were conducted on all participants.

Results: The prevalence of hearing impairment was 19.6%. The hearing impairment in majority of cases was of a mild degree i.e., 26 to 40 dB (93.9%) of which majority of children (99.0%) had conductive loss. Wax was the commonest cause of hearing loss (79.2%). CSOM was found in 19.0% children.

Conclusions: The prevalence of hearing impairment in school going children in rural area district Dehradun was high. Majority of the etiological factor of hearing impairment identified were preventable. Proper assessment and diagnosis of hearing loss in children at early age is important for better development and psychosocial development.

Keywords: Prevalence, Etiology, Hearing impairment, School going children

INTRODUCTION

Hearing impairment is defined as condition in which a person has difficulty in hearing conversational speech, difficulty in hearing loud sounds, can only hear some words if they are shouted into ear or cannot even hear shouted words. A person who cannot even hear shouted words has deafness or is said to be deaf.¹

Hearing impairment in children is a major public health problem in developing countries. It is unfortunate that hearing impairment obstructs their overall development. 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 the problem in the community.²

360 million people in the world suffer from disabling hearing loss. This constitutes a substantial 5.3% of the world's population. The prevalence and incidence of hearing impairment in India also are substantially high. The high burden of deafness globally and in India is largely preventable and avoidable. The prevalence of deafness in South-East Asia ranges from 4.6% to 8.8%.¹

In India, 63 million people (6.3%) suffer from significant hearing loss. Four in every 1000 children suffer from

severe to profound hearing loss, with over 100,000 babies born with hearing deficiency every year. The estimated prevalence of adult onset deafness in India was found to be 7.6% and childhood onset deafness to be 2%. 60% of childhood hearing loss is due to preventable causes.¹

Limited literature is available on prevalence and severity of hearing impairments among school children in Uttarakhand. Hence this study is being planned to find out the prevalence of hearing impairment in school going children (6 to 17 years) of rural area of district Dehradun as well as to know the pattern of hearing loss and causative factors of hearing impairment in children.

METHODS

This is an observational, cross-sectional study conducted under the Department of Otorhinolaryngology, of Himalayan Institute of Medical Sciences (HIMS), Swami Ram Nagar, Dehradun, over a period of 12 months from 2016- 2017. The protocol for the study was submitted to institutional ethical committee and clearance was obtained from the concerned authority.

Inclusion criteria

Children between the age 6 to 17 years, who attend the school on the day of the screening program.

Exclusion criteria

Children below 6 year and above 17 year. Children who did not cooperate throughout the evaluating process.

Sampling type: Multistage random sampling.

Sample size

Sample size was calculated by the formula $4pq/d^2$, where p=available local prevalence rate in the target population (from comparable studies 1, 2), i.e. 12.

$q=100-p$

d=relative precision (20% of previous prevalence) keeping in view the 10% non-response rate, final sample size comes out to be 516.

Tools of instruments used case reporting form (pre-structured and pre-tested) was used. Otoscope (Welch Allyn 3.5v) was used. Pure tone audiometer (ALPS advanced digital audiometer AD 2000) was used.

Data collection process

Rural area of district Dehradun comprises of 6 blocks. Out of this one block was selected randomly. Then a list of all government and private schools (1 to 12 class) was made and four schools (2 private and 2 government) was selected randomly. Total enumeration of children was

done. At first, children were screened by pure tone audiometry test. Then the children found to be having impairment were further assessed.

Bio data of each participant was recorded with the help of the class teacher prior to starting the examination. The examination commenced with pure tone audiometry test followed by otoscopic examination of both the right and left ear.

In this study a swollen and tender pinna/EAC was considered to be otitis externa whilst fungal infection (otomycosis) was diagnosed based on fungal debris in the EAC. Chronic suppurative otitis media (CSOM) was diagnosed based on the presence of perforated tympanic membrane.

The ambient sound levels ranged from 45 to 55dB. Air-conduction hearing threshold levels of greater than 25dB at any of these frequencies were taken to indicate possible hearing loss.

Data analysis

Data was analyzed using freely available software solutions (SPSS Version 22) and electronic spreadsheets (MS Excel) to store and manage the collected data. Descriptive analysis was done to determine means, frequencies and proportions of the various variables and findings were presented by means of graphs, tables and charts where appropriate. Chi-square test was used to assess any associations/relationships between outcomes and other variables. Confidence level was taken as 95% (p<0.05) where applicable.

RESULTS

A total of 1003 school children were included in the study. The age-gender distribution of the study subjects is shown in Table 1. Out of the 1003 children, 525 (52.3%) were boys and 478 (47.7%) were girls (Figure 1). The male to female ratio of 1:1.09.

Table 1: Age - gender distribution (n=1003).

Age-group (in years)	Gender		Total (n=1003)
	Male (n=525)	Female (n=478)	
	N (%)	N (%)	N (%)
6-8	80 (15.2)	71 (14.9)	151 (15.1)
9-11	124 (23.6)	97 (20.3)	221 (22.0)
12-14	188 (35.8)	157 (32.8)	345 (34.4)
15-17	133 (25.3)	153 (32.0)	286 (28.5)

*Chi-square p<0.120.

Out of 1003 students who participated in this study, 806 (80.4%) of the students had normal hearing and 197 (19.6%) had hearing impairment (Figure 2).

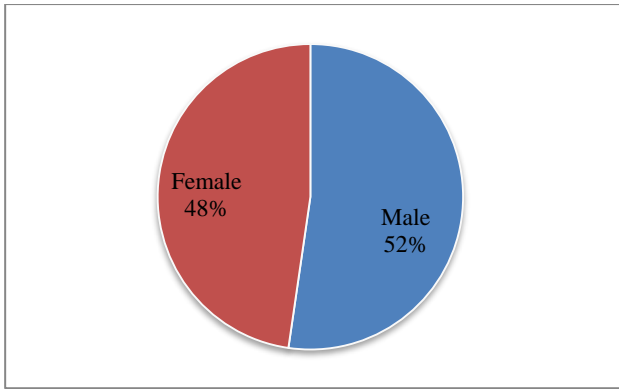


Figure 1: Sex-wise distribution.

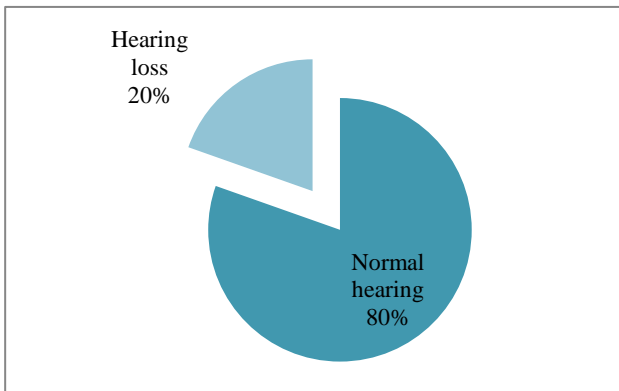


Figure 2: Hearing impairment.

Among the children who had hearing impairment, the female population had a significantly higher prevalence rate of 21.3% as compared to males who had a prevalence rate of 18.0% whereas overall prevalence was 19.6% (Figure 3).

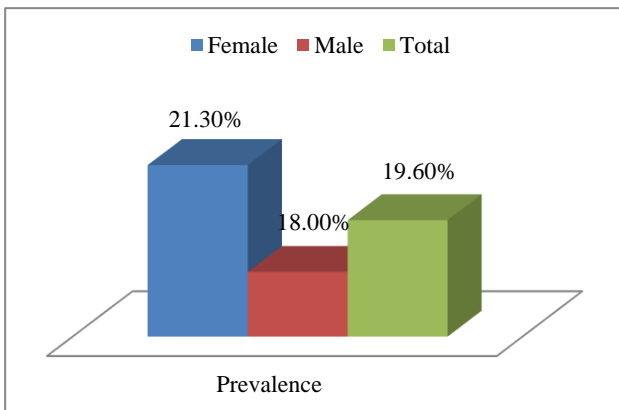


Figure 3: Prevalence of hearing impairment.

*Chi-square $p < 0.197$.

In present study, the most prevalent ear disease was found to be impacted wax (37.41%). The second most common cause was found chronic otitis media 9.6% and the least common cause of hearing impairment was auricular malformation in 1.0% (Table 2).

Table 2: Etiological factors of conductive type of hearing loss.

Etiological factors	Gender		Total (n=197)
	Male (n=95)	Female (n=102)	
	N (%)	N (%)	N (%)
Wax	74 (77.9)	82 (80.4)	156 (79.2)
Otomycosis	4 (4.2)	9 (8.8)	13 (6.6)
COM (inactive)	11 (11.6)	6 (5.9)	17 (8.6)
COM (active)	2 (2.1)	0 (0.0)	2 (1.0)
ETD	3 (3.2)	0 (0.0)	3 (1.5)
SOM	0 (0.0)	4 (3.9)	4 (2.0)
Auricular malformation	1 (1.1)	1 (1.0)	2 (1.0)

*Chi-square $p \text{ value} > 0.011$.

Amongst the affected children majority had conductive hearing loss (99.0%), (1.0%) had mixed hearing loss and no children had found sensorineural loss (Figure 4).

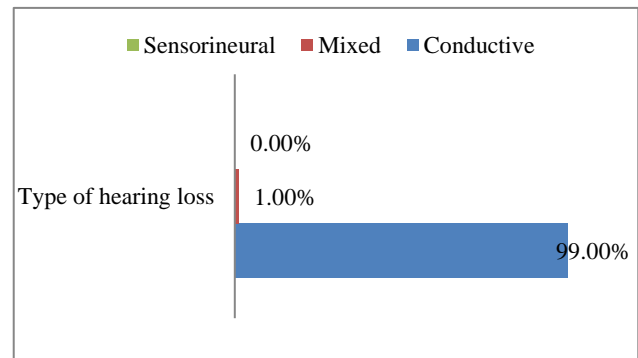


Figure 4: Type of hearing loss.

*Chi-square $p \text{ value} < 0.141$.

In the present study it was observed that out of 197, children 185 (93.9%) children had mild degree of hearing loss. 10 (5%) children were having moderate hearing loss and only 2 (1%) children had severe hearing loss. No children were found to have profound hearing loss (Figure 5).

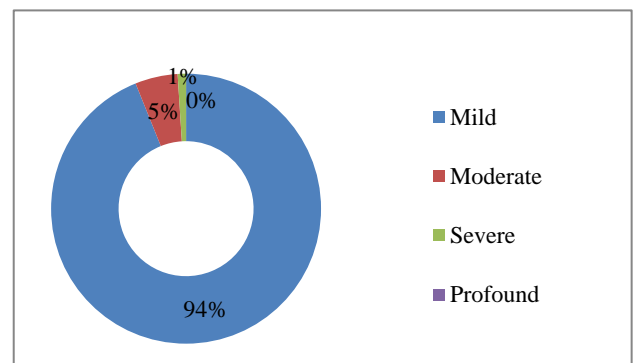


Figure 5: Degree of hearing loss.

*Chi-square $p < 0.583$.

DISCUSSION

In our study we observed slight male preponderance with 525 (52.3%) cases being males and 478 (47.7%) cases being females. These findings were similar with the studies of Norman et al who also reported a males 52% and female was 48% respectively. While Ahmed et al reported male 41.8% and female was 58.2%.^{3,4}

In our study a prevalence rate of as much as 11% was found in otherwise apparently normal school children. These results are similar to those of Mishra et al and Sapra et al who found a prevalence rate of 21% and 16.60% respectively.^{7,8}

The prevalence of hearing impairment in present study was slightly higher in female (21.3%) children than in males (18.0%). Other studies have reported similar findings, Nduka et al, females were 34.0% and males were 24.9%, Rao et al, females were 12.1% and males were 11.8% but in study of Kalpana et al showed that there was a male predominance 6.8% as compared to females 4.2%. The probable reason for higher prevalence of hearing impairment was poor family attention to female child.^{2,9,10}

Wax impaction (79.2%) in this study could have been the most common ear disease because in the majority of cases it is asymptomatic and a coincidental finding. In the series of Rao R et al, Chishty et al, wax as the most common cause of hearing impairment, which accounted for 63% and 41.94% respectively.^{2,11}

Children with conductive hearing impairment were much more common (99.0%) than with mixed type (1.0%), sensorineural type (0.0%). Whereas Kalpana et al, in their study found that CHL (96.2%), (0.75%) had mixed hearing loss and (3.03%) had sensorineural loss. Sapra et al, found that CHL (96.7%) while (2.41%) were sensorineural hearing loss and (0.80%) were mixed hearing loss.⁹

We are very fortunate that the conductive hearing loss is so common which in most of the cases can be treated either medically or by surgery.

In our series most of the children had mild (93.9%) degree of hearing impairment followed by moderate degree (5.1%) and severe degree (1.0%) hearing impairment. No case of profound degree of hearing impairment was found in our study. Nduka et al reported, 58.9% had slight or mild hearing impairment, 5.5% moderate to severe, and none was found to have profound hearing loss.¹⁰

Children with profound hearing impairment were not found because they do not go to mainstream school but instead attend special schools and majority of children in our study was suffering from mild degree of hearing impairment the probable reason may be less or slightly

degree of hearing loss was asymptomatic for which they unnoticed by parents and teachers and had no consult to the doctor.

CONCLUSION

This study has revealed the magnitude of hearing impairment of rural area of district Dehradun. Conductive hearing impairment due to wax appear to be the most common single treatable factor likely to be managed with conservative means. As also in fungal infection which is treated with local clearance with restoration of the serviceable or normal hearing. Early detection and treatment of the treatable cause of hearing impairment prevent the poor scholastic attainment, speech and behavior. Knowledge of rehabilitation in the form of hearing aids and administrative means like allotting front seats to the hearing impaired children in the classroom be stressed. Wide publicity is desirable to make the parent, teachers and educationalists aware of serious problems, which can occur due to hearing impairment. Audiology is needed in all screening programs to cut down number of children developing hearing loss.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Varshney S. Deafness in India. *Indian J Otol.* 2016;22(2):73.
2. Rao R, Subramanyam M, Nair N, Rajashekhar B. Hearing impairment and ear diseases among children of school entry age in rural South India. *Int J Pediatr Otorhinolaryngol.* 2002;64(2):105-10.
3. Norman P, Chandran M, Dhandapani T. Prevalence of hearing impairment in school children (aged 8-14 years) in the villages of Vadamanthal, Tamil Nadu, India. *Int J Community Med Public Health.* 2016;3(12):3369-73.
4. Ahmed A. Hearing Impairment in a Semi-urban Community in North-Western Nigeria. *European J Prevent Med.* 2016;4(5):113.
5. Parvez A, Khan Z, Hashmi S, Khan M. A cross sectional study of chronic suppurative otitis media and its associated factors among primary school children in rural and urban areas of Aligarh, India. *Int J Community Med Public Health.* 2016;3(8):2150-4.
6. Feder K, Michaud D, McNamee J, Fitzpatrick E, Ramage-Morin P, Beauregard Y. Prevalence of Hearing Loss Among a Representative Sample of Canadian Children and Adolescents, 3 to 19 Years of Age. *Ear Hearing.* 2017;38(1):7-20.
7. Mishra A, Verma V, Shukla, SubhashG K, Mishra C, Dwivedi R. Prevalence of Hearing Impairment in the District of Lucknow, India. *Indian J Public Health.* 2011;55(2):132-5.

8. Sapra G, Srivastava SP, Modwal A, Saboo R, Saxena G, Gyanu Y. Hearing Assessment of School Going Children of Various Schools in Jaipur, Rajasthan. *Scholars J Applied Med Sci.* 2015;3(2):638-45.
9. Kalpana R, Chamyal PC. Study of prevalence and etiology of the hearing loss amongst school going children. *Indian J Otolaryngol Head Neck Surg.* 1997;49:142-4.
10. Nduka I, Aitafo EJ, Nduka EC. Prevalence of hearing impairment amongst primary school children in Port-Harcourt, Rivers State: Implication for strengthening of school health programme in Nigeria. *J Med Investigations Pract.* 2014;9(3):1-4.
11. Chishty SL, Hamid S, Esbah-i-lateef M, Chishty L, Wani A. A prospective study of hearing impairment in school going children of Ghaziabad a tertiary care hospital. *Int J Res Med Sci.* 2014;2(3):1127-33.

Cite this article as: Saini S, Bist SS, Kumar L. Prevalence and etiological factor of hearing impairment among school going children in rural area of district, Dehradun. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:680-4.