Research Article

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20161397

Prevalence of hearing impairment among primary school children in rural and urban areas of Aligarh, Uttar Pradesh, India

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Received: 12 March 2016 Revised: 14 March 2016 Accepted: 06 April 2016

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ABSTRACT

Background: Hearing impairment in school children is particularly important because it is the earliest time when the foundation for education and mental and linguistic development is laid down. Present study aims at estimate the burden of hearing impairment among school children in rural and urban field practice areas of Urban and Rural Health Training Centers, JNMCH, AMU, Aligarh, Uttar Pradesh, India.

Methods: Estimated sample of 630 was taken. Sampling method: probability proportionate to size (PPS) and stratified random sampling. The children were interviewed using semi structured format followed by general examination and assessment of hearing function. The diagnosis of hearing impairment was done on the basis of history, voice test and abnormal tuning fork tests. It was considered to be present when at least either of the voice test and tuning fork tests was found to be abnormal.

Results: The prevalence of Hearing Impairment among the study population was found to be 17.9% (109/610), observed to be higher among rural (18.8%) as compared to urban (13.5%) school children. It was found to be significantly associated with Standard of living Index (SLI) and nutritional status of the children.

Conclusions: The study highlights the high burden of hearing impairment in study population and the need for strengthening the school health activities focused on hearing impairment.

Keywords: Hearing impairment, School children, Adolescents, School based study

INTRODUCTION

The ability to communicate is a very essential aspect of living. Auditory system is most essential for communication and indispensable for mental and linguistic development. Hearing impairment is said to be present when there is difficulty in hearing conversational speech or identifying most sounds. Children need good hearing to develop proper speech and to hear as they learn. Hearing loss is included among the commonest

disabilities in the world, often described as the hidden disability.² According to world health organization, over 5% (360 million people) of World Population is suffering from disabling hearing loss which includes 32 million children. However, this is largely preventable and at least 50% of the burden of hearing loss can be prevented by cost effective measures.³

Ear diseases are particularly important in primary school children because it is the earliest time when they learn

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about society and social practices. It is also the high time when the foundation for literacy and education is laid down. Because of the insidious initiation and progression of ear diseases, people mainly in the under privileged sections of the society tend to ignore these ailments which progress in due course and lead to serious impairment. A school is a reflection of community for that specific age group representation. As not many studies have been done in Uttar Pradesh, therefore the current study was taken up among primary school children to estimate the prevalence of hearing impairment in primary school children of rural and urban areas registered under R.H.T.C. and U.H.T.C., Department of Community Medicine, J.N. Medical College, A.M.U., Aligarh, Uttar Pradesh, India. And to find out the association of hearing impairment with certain sociodemographic, nutritional status, personal hygiene and environmental factors.

METHODS

Present study is a part of a larger study that was conducted in 12 primary schools in registered areas of rural and urban health training centres under the department of community medicine, J.N. Medical College, Aligarh Muslim University, Aligarh, Uttar Pradesh, India. The duration of this study was one year August 2010 to July 2011. The sample size was an estimated sample of 630 children from both rural and urban areas was chosen.

The sample size calculation of Present study is part of a larger study that was conducted among the study population with the objective of finding out the prevalence of common ear diseases and the sample size was calculated to be 630, by using the formula n = 4 pq/l; (where p taken to be 15.3% which is the prevalence of CSOM as reported in a study conducted among children age 5-15 years in a rural area in Haryana, India, q = 100-p). After taking relative error (l) of 20 % of p and non-response of 10%, the final sample size came out to be 628, rounded off to 630. Non-response; out of the total 630 school children, 20 were found to be non-responsive thereby giving the non-response rate of about 3.0%. Therefore final analysis in our study was done on 610 cases.

The sampling procedure was total number of children to be taken from each school and class was calculated by the probability proportionate to size (PPS) method. Attendance register was used as sampling frame. The required number of children from a particular class was picked up by using the simple random sampling with the help of random number table applied on the attendance register (sampling frame). If a child was found to be absent on the day of interview, the next child in the attendance register was taken into account. If that child is also found to be absent, then next child in the attendance register was taken into the study.

Inclusion criteria and exclusion criteria

The consent of the principal of the school was taken as the criteria for including/excluding a child into study.

The data was collected by the child was interviewed using a semi structured proforma for assessing any difficulty in hearing as well as collecting sociodemographic and other information. The child was then examined for hearing function using tuning fork. The tests employed for assessing hearing function included; voice tests, Rinnie's tests and Weber's test operational. The diagnosis of hearing impairment was done on the basis of history, voice test and abnormal tuning fork tests. Hearing Impairment was said to be present when at least either of the voice test and tuning fork tests were found to be abnormal.

Statistical analysis

The data collected so was tabulated and presented as percentages and proportions. Appropriate statistical tests were applied.

The study had been approved from institutional ethics committee, JNMCH, AMU, Aligarh, Uttar Pradesh, India. Consent was taken from the principals of the school. Children in need of medical attention were either referred at RHTC/UHTC. Health education regarding ear hygiene practices for the prevention of ear diseases was provided to all children.

RESULTS

Socio-demographic profile of study subjects

Majority of the children were in the age group of 8-10 years (38.5%) followed by 6-8 years (36.4%). Approximately half of the children (51.1%) were females. Majority of the children's father were Unskilled/Semiskilled labourers (38.8%) followed by skilled labourers (30.6%) while majority of the children's mothers were Illiterate (60.2%) followed by just literate/non-formally educated mothers. Regarding 'standard of living' index, majority of the children belonged to high (54.6%) followed by medium (33.1%) and low standard of living index (12.3%). Together, high and medium standard of living index constituted 87.7% of the total children.

Prevalence of hearing impairment

The over-all prevalence of hearing impairment among the study subjects was found to be 17.9 % (109/610). It was observed to be higher among rural (18.8%) as compared to urban (13.5%) school children, however this finding was not found to statistically significant (p>0.05).

The distribution of hearing impairment with respect to age and gender is shown in (Table 1). It was found to be

highest among children aged less than 6 years (31.6%) while lowest rate was observed among children aged 10-12 years (15.3%). With respect to age of the children, no statistically significant difference (p>0.05) was observed in the prevalence of hearing impairment. Almost equal

prevalence of hearing impairment was observed among male and female children (17.8% among male versus. 17.9% among females). Similar to age group, no significant difference (p>0.05) was observed between hearing impairment and gender of the child.

Table 1: Hearing impairment with respect to age and gender among study subjects (n=510).

	Hearing Impairment		p	
Age Group	Present (n=109)	Absent (501)		
<6 years (n=19)	06 (31.6 %)	13 (68.4%)	p> 0.05	
6 to 8 years (n=222)	40 (18.0 %)	182 (82.0%)	$\chi^2 = 4.104,$ d.f.=4,	
8 to 10 years (n=235)	40 (17.0%)	195 (83.0%)		
10 to 12 years (n=111)	17 (15.3%)	94 (84.7%)		
>12 years (n=23)	6 (26.1%)	17 (73.9%)	-	
Sex				
Male (n=298)	53 (17.8 %)	245 (82.2 %)	p> 0.05	
Female (n= 312)	56 (17.9%)	256 (82.1%)	$\chi^2 = 0.003$, d.f.=1,	
Place of school				
Rural (n=499)	94 (18.8%)	405 (81.2%)	p> 0.05	
Urban (n=111)	15 (13.5%)	96 (86.5%)	$\chi^2 = 1.754$, d.f.=1,	

Table 2: Hearing impairment with respect to nutritional status and personal hygiene.

Nutritional status	Hearing I	p	
	Present (%)	Absent (%)	
Normal (n=389)	55 (14.1%)	334 (85.9%)	p < 0.05 $\chi^2 = 10.179$
Thin/severely thin(n=221)	54 (24.4%)	167 (75.6%)	$\chi^2 = 10.179$
Total (n=610)	109 (17.9%)	501 (82.1%)	
Personal hygiene			
Good (n=111)	14 (12.6%)	97 (87.4%)	p > 0.05 $\chi^2 = 2.554$
Poor/fair (n=499)	95 (19.0%)	404 (81.0%)	$\chi^2 = 2.554$
Total (N=610)	109 (17.9%)	501 (82.1%)	

Hearing impairment with respect to nutritional status and personal hygiene

Majority of the school children in our study, were found to be having normal nutritional status (63.8%) followed by thin (26.1%) and severely thin (10.2%). Together, thinness and severe thinness was present in 36.3% of the total children. The prevalence of hearing Impairment was found to be significantly higher (p<0.05) in children who were thin/severely thin (24.4%), than those with normal nutritional status (14.1%).

Personal hygiene was assessed through self-developed scale. Most of the children were found to be having fair (61.6%) followed by poor (20.2%) and good (18.2%) personal hygiene. Though hearing impairment was observed to be more prevalent among the children having poor/fair personal hygiene (19%) as compared to those with good personal hygienic status (12.6%) but this was not found to be statistically significant (p>0.05).

Hearing impairment with respect to father's occupation and mother's education

No statistically significant association was observed between father's occupation and hearing impairment among children. Similarly, hearing impairment was also not found to be associated significantly with mother's education.

Hearing impairment to with respect to standard of living index (SLI), overcrowding and exposure to smoke

The prevalence of hearing impairment was found to be highest among children belonging to low SLI (33.3%) followed by intermediate (21.3%), then high (12.3%). This difference was found to be statistically significant (p<0.05).

About 80% children were reported to be living in overcrowded dwellings. Almost similar proportion of study children reportedly found to be exposed to smoke (tobacco or environmental). Although hearing

impairment was observed to be higher among overcrowded families but it was not found to be statistically significant (p>0.05). Similarly, hearing

impairment was also not found to be associated with exposure to smoke (p>0.05).

Table 3: Hearing Impairment with respect to certain other socio-demographic factors and environmental factors.

Casia Jamasuankia faataus	Hearing impairment			
Socio-demographic factors	Present (%)	Absent (%)	P	
Father's occupation				
Unemployed (n=19)	3 (15.8 %)	16 (84.2%)		
Unskilled/Semi-skilled (n=231)	46 (19.9%)	185 (80.1%)		
Skilled (n=183)	33 (18.0%)	150 (82.0%)	p>0.05	
Business, shop-keeper, farmer (n=104)	17 (16.3%)	87 (83.7%)	p>0.03	
Service, professional (n=62)	8 (12.9%)	54 (87.1%)		
Total (n=599)	107 (17.9%)	492 (82.1%)		
Mother's education				
Illiterate (n=364)	64 (17.6%)	300 (82.4%)	p>0.05	
Just literate/No formal education (n=114)	19 (16.7%)	95 (83.3%)		
Primary school (n=61)	12 (19.7%)	49 (80.3%)		
Middle school (n=34)	6 (17.6%)	28 (82.4%)	$\chi^2 = 1.848$	
High school (n=21)	3 (14.3%)	18 (85.7%)	d.f. = 6	
Intermediate and above (n=11)	2 (18.2%)	9 (81.8%)		
Total (n=605)	106 (17.5%)	499 (82.5%)		
Standard of living index (SLI)				
Low (n=75)	25 (33.3%)	50 (66.7%)	0.05	
Medium (n=202)	43 (21.3%)	159 (78.7%)	$p<0.05 \chi^2 = 20.836$	
High (n=333)	41 (12.3%)	292 (87.7%)	$\chi = 20.830$ d.f.= 2	
Total (n=610)	109 (17.9%)	501 (82.1%)	u.i.– 2	
Overcrowding				
Present (n=530)	98 (18.5%)	432 (81.5%)	p>0.05	
Absent (n=80)	11 (13.8%)	69 (86.3%)	$\chi^2 = 1.064$	
Total (n=610)	109 (17.9%)	501 (82.1%)	d.f. = 1	
Exposure to smoke (Environmental/Tobacco)				
Present (n=493)	85 (17.2%)	408 (82.8%)	p>0.05,	
Absent (n=117)	24 (20.5%)	93 (79.5%)	$\chi^2 = 0.690$	
Total (n=610)	109 (17.9%)	501 (82.1%)	d.f. = 1	

DISCUSSION

Present study was conducted among school children selected randomly from the primary schools in the rural and urban field practice areas under the department of community medicine, JNMCH, AMU, Aligarh, Uttar Pradesh, India. The prevalence of hearing impairment was found to be 17.9%. Similar to present study, a prevalence of hearing impairment of 19.56% has been reported in a study conducted among 12-14 years age school children in Chandigarh.⁵ The prevalence of hearing impairment of 13.05% has been reported in a study conducted among 339 kindergarten school children in Mangalore, India.⁶ In an another study conducted among 1200 school children of age 4-17 years in Pune, India, about 11.8% children were found to be suffering from deafness which is lower than ours.⁷ A similar

prevalence of 11.9% has also been reported from Manipal, Karnataka, India, among 855 school children studying in first standard.⁸ In a study conducted among 555 primary school children in Egypt, the prevalence of Hearing Impairment was reported to be 20.1%.⁹

In a study conducted among 1567 secondary school children age 12-19 years in China, the prevalence of hearing impairment has been reported it to be 1.86%. 10 These wide variations in the prevalence of hearing prevalence may be attributed to different diagnostic criteria used in these studies. In our study, the association of hearing impairment with age, sex and place of school, was not found to be significant (p>0.05). Similarly the association of hearing impairment with occupation of father and maternal education was also found to be non-significant (p>0.05). In our study, we found a significant association between Hearing Impairment and S.L.I

(p<0.05). The prevalence of CSOM was highest in Low S.L.I. (33.3%) followed by medium (21.3%) and high S.L.I. (12.3%). Similar association has also been reported by certain other studies.^{8,9}

In our study, no significant association was noted between Hearing Impairment and Overcrowding, similar to a study conducted in Egypt. A non-significant association between hearing impairment and exposure to smoke has been noted in the present study. However, many other studies have reported a significant association between hearing impairment and passive smoking. Phil 11.12 This difference from our study can be explained due to the reason that we have taken both Environmental and Tobacco smoke either or together regarding exposure to smoke.

CONCLUSION

Present study suggest that the burden of hearing impairment is quite high in study population, which was not found to statistically different between male/female, rural/urban and increasing age of the children. It was found to be significantly associated with the socioeconomic status and nutritional status of the children. Present study highlights the urgent need for strengthening the school health activities focused on screening of these children for hearing impairment. Awareness of ear diseases among the public should be strengthened by the use of I.E.C. materials and local campaigns. School teachers should be encouraged to provide information regarding Health Promotion to the school children especially in context to the Personal Hygiene and Ear Hygiene. School based screening program for the early detection of hearing impairment should be universalized and proper referral system for the treatment should be present for the children found to be having some ear diseases. Nutritional education should be incorporated into the educational curriculum of Primary Schools. Further in depth research activities need to be carried out in Uttar Pradesh in order to properly assess the magnitude hearing impairment and to find out the associated/causal factors for hearing impairment.

ACKNOWLEDGEMENTS

Authors are thankful to the school children, and the school administration for cooperating in the study.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Parvez A, Siddiui AR, Khan Z, Hasmi S, Khan MS. Prevalence of hearing impairment among primary school children in rural and urban areas of Aligarh, Uttar Pradesh, India. Int J Community Med Public Health 2016;3:1273-7.