

ORIGINAL RESEARCH

HEARING LOSS PREVALENCE AND DETERMINANTS IN PRIMARY SCHOOL CHILDREN IN SELECTED SAMBALPUR SCHOOLS

¹Kamalini Bepari, ²Soubhagini Acharya, ³Sayambika Mishra, ⁴Fakir Mohan Mohanta

¹Assistant Professor, ²HOD, ³P.G., Department of E.N.T, Veer Surendra Sai Institute of
Medical Sciences and Research, Burla, Odisha, India

⁴Assistant Professor, Department of E.N.T, Sundergarh Medical College, Sundergarh, Odisha,
India

Correspondence:

Fakir Mohan Mohanta

Assistant Professor, Department of E.N.T, Sundergarh Medical College, Sundergarh, Odisha,
India

ABSTRACT

Background: Hearing impairment in school-aged children is especially essential because it is at this age that the basis for education, mental, and language development is built. The current study attempts to quantify the burden of hearing impairment among school children in Sambalpur, Odisha, both rural and urban.

Methods: In addition to clinical evaluation, pure tone audiometry at speech frequency was performed on 5500 pupils in Burla, Sambalpur, and Hiraikud to screen out cases of deafness. Attempts were made to delve into the numerous circumstances that contributed to their deafness. In addition, other information such as the respondents' parents' socioeconomic position, social adequacy, history of the current and past disease, and so on was gathered.

Results: Sambalpur has the greatest incidence of deafness (11.25 percent), followed by Hiraikud NAC (10.48 percent) and Burla (9.15 percent). Deafness was most common in children aged 5-6 years (42.93 percent, with 40.97 percent conductive and 1.81 percent sensorineural) and least common (7.55 percent) in children aged 13 and up. There was no discernible variation in the incidence of deafness by sex or side of affection. Secretory otitis media (37.21 percent) was the most common cause of deafness among cases of conductive deafness, especially among children under the age of five.

Conclusion: The study emphasises the significant prevalence of hearing impairment in the study population and the need to increase hearing impairment-focused school health initiatives.

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

INTRODUCTION

Hearing loss of even 15 decibels can cause hearing disability in youngsters and, as a result, affect their mental development [1, 2, 3]. These deficits might cause diverse problems in children due to the onset of secreted middle ear otitis during a key period. These difficulties can result in behavioural issues in six functional areas: mental maturity, perception, speech and communication, cognition and general intelligence, academic accomplishment, and interpersonal behaviours [4, 5]. Hearing loss in newborns and children frequently interferes with speech and language development, compromising academic performance as well as social and emotional well-being [6].

In developing nations, these issues can be exacerbated since children with hearing loss are frequently found late, secluded, and mistreated, with very few obtaining any form of education. When compared to other countries, Indian figures are extremely high. The most common cause was otitis media, as chronic otitis media or secretory otitis media are more common in tropical nations [7, 8].

According to WHO (2018) data, the prevalence of hearing loss (HI) in India is approximately 6.3 percent (63 million people suffering from significant auditory loss). Adult-onset deafness is predicted to be 7.6 percent in India, whereas childhood-onset deafness is 2% [9]. According to the National Sample Survey Organization 1991 study, 2.7 percent of children aged 0 to 14 years in rural India had hearing impairment [10]. In the same age group, the urban numbers are 3.0 percent, while the rural and urban data are 8.9 percent and 8.3 percent, respectively [11]. Because few studies have been conducted in Sambalpur, Odisha, the current study was conducted among primary school children to assess the prevalence of hearing impairment in rural and urban primary school students. The major goal is to investigate the causes of deafness and then compare the causes of hearing loss in school-aged children in Sambalpur.

METHODS

PLACE OF STUDY

Department of E.N.T., VIMSAR, Burla

PERIOD OF STUDY

November 2017 to October 2019 (24 months)

STUDY DESIGN

Community-based observational study.

STUDY POPULATION

School-going children of Sambalpur.

SAMPLING

A sample of around 5000 will be selected using the purposive sampling technique. The sample comprises Sambalpur primary school children as inclusion criteria. Students under the age of five and those over the age of ten were excluded.

METHODOLOGY

A questionnaire was given to the class teacher in order for them to identify pupils who had hearing and speech abnormalities. The parents of the children were also given a supplementary questionnaire to document any speech or hearing impairments that they discovered in their children. The questionnaire given to teachers and parents was concise, well-planned, and prepared to capture information such as the child's correct age, hearing status, and any previous history of fever, sore throat, eruptive fever, head injury, and so on. It also inquired about the child's speech status, as well as any family history of mortality or any other associated morbid health-related sickness.

RESULTS

A survey was done in Sambalpur to determine the prevalence of hearing loss among school-aged children. The study also addressed many causal elements that contribute to this illness. The study's subjects were chosen from schools in Sambalpur, Burla, and Hirakud. To prevent bias, students from both private and public schools, as well as government schools, were included in the current study. Students from public schools appear to be from a higher socioeconomic category. Subjects in the current study were those who had any degree of hearing loss, which the investigator discovered by visiting each class of schools.

Fig 1: No. of students according to locality

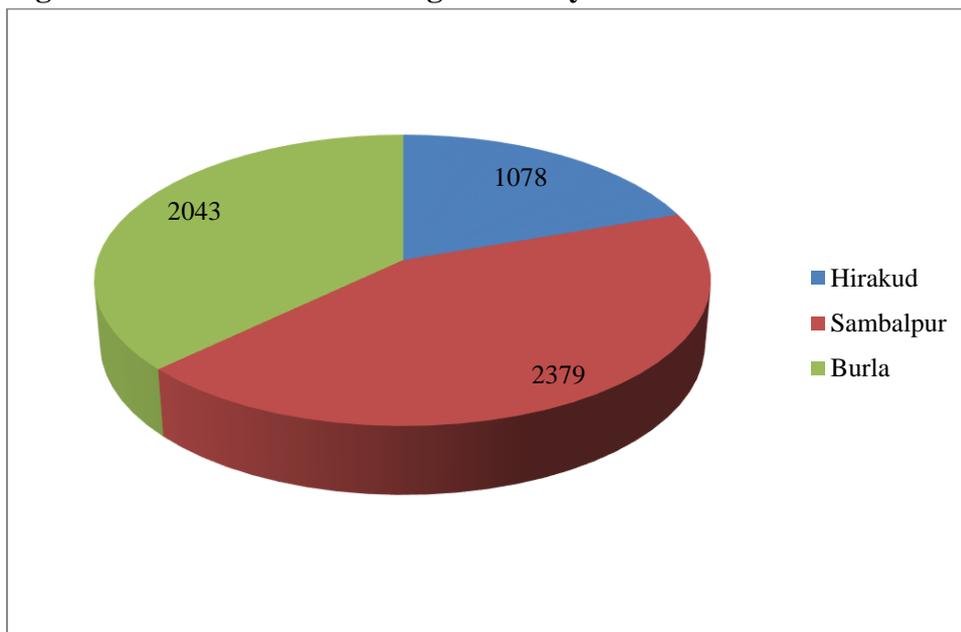
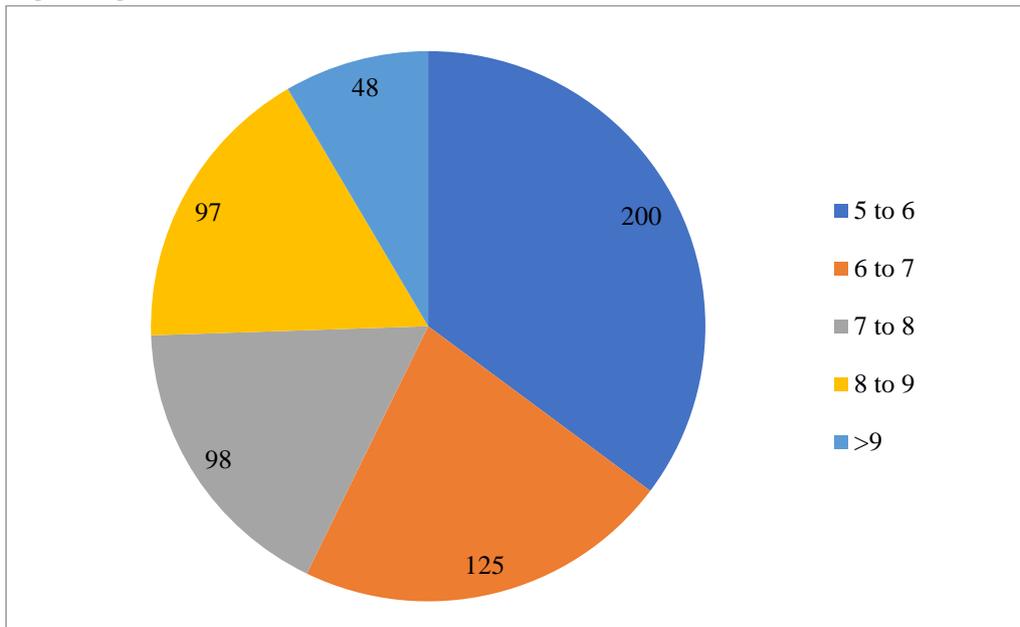


Table 1: Distribution of deafness among various localities

Name of locality	Total no of children	No of deaf children	Percentage
Hirakudnac	1078	113	10.48
Sambalpur town	2379	268	11.25
Burla nac	2043	187	9.15
Total	5500	568	10.32

According to the preceding figure and table, 568 pupils out of 5500 had some degree of deafness, amounting to 10.32 percent. Sambalpur residents had the highest hearing loss, followed by Hirakud NAC and then Burla NAC.

Fig 2: Age distribution of deafness**Table 2: Age incidence of different types of deafness**

Age in years	Conductive deafness		Sensorineural deafness		Mixed deafness	
	No.	%	No.	%	No.	%
5 to 6	190	33.45	9	1.58	1	0.17
6 to 7	113	19.89	9	1.58	3	0.52
7 to 8	94	16.54	3	0.52	1	0.17
8 to 9	92	16.19	4	0.70	1	0.17
More than 9	43	7.57	5	1.23	0	--
Total	532	93.66	30	5.28	6	1.05

Figure 2 shows that the prevalence of deafness decreases with increasing age. Table 2 demonstrates that conductive and sensorineural deafness had the highest incidence, 33.45 percent and 1.58 percent, respectively, among children aged 5 to 6 years. The incidence of deafness, both sensorineural and conductive, decreases with age. Cases of mixed deafness followed a similar pattern.

Table 3: Distribution of types of deafness according to sex of the children (568 cases)

Sex	Conductive deafness	Percentage	Sensorineural deafness	Percentage	Mixed deafness	Percentage
MALE	289	50.88	16	2.81	2	0.35
FEMALE	243	42.78	14	2.46	4	0.70
TOTAL	532	93.66	30	5.28	6	1.05

According to the above table, males have a higher incidence of both conductive and sensorineural deafness than females.

Table 4: Aetiological factors in conductive deafness

Etiological factors	No. Of cases	Percentage
EXTERNAL EAR	192	36.09
WAX	110	20.67
OTOMYCOSIS	60	11.27
OTHERS	22	4.13
MIDDLE EAR	340	63.90
SECRETORY OTITIS MEDIA	198	37.21
CSOM(ACTIVE)	80	15.03
CSOM(DRY)	30	5.63
RTM	25	4.69
OTHERS	07	1.31
TOTAL	532	100

The accompanying table summarises the underlying causes of conductive type deafness in this series. There were 192 cases (36.09%) of conductive deafness related to pathology in the external ear and 340 cases (63.90 percent) of hearing loss due to middle ear illnesses. External ear cerumen (wax) was the most common cause, accounting for 20.67 percent of cases. Otomycosis was responsible for 11.27 percent of cases, whereas other causes accounted for 4.13 percent. Similarly, among middle ear diseases, secretory otitis media was the most common, accounting for 37.21 percent of cases. Active CSOM accounted for 15.03 percent, with CSOM (dry) accounting for 5.63 percent. RTM was discovered in 4.69 percent of the instances. The remaining 1.31 percent of cases had various middle ear disorders.

DISCUSSION

In Sambalpur, 5500 students between the ages of 5 and 10 were evaluated for hearing loss. During the investigation, it was discovered that the information acquired from parents of government school students was inferior to that received from parents of public-school children. This could be attributed to the fact that public school students have a greater socioeconomic standing and a stronger educational background. According to the data shown above, 568 of the 5500 pupils had some degree of deafness, accounting for 10.32 percent. Sambalpur residents had the most hearing loss, followed by HiraKud NAC and then Burla NAC. This finding is also consistent with the findings of Kalpana et al (1997) of Pune [12] and Chopra et al (1999) [13] of Ludhiana, Chetty (2000) [14] of Berhampur, Sandeep et al (2012) [15] of Andhra Pradesh, and Maiti et al (2016) [16] of Malda, West Bengal, who found 11.0 percent, 12.16 percent, 13.40 percent, 10.34 percent, and 10.28 percent hearing loss among school children, respectively.

Table 2 shows that the incidence of deafness decreases with increasing age in our study. Tuli et al (1988) [17], Vasistha et al (1988) [18], and others made similar observations. In our study, the majority (532 people, or 93.66 percent) had conductive deafness, whereas 5.28 percent had sensorineural deafness and 1.05 percent had mixed deafness. This is also consistent with the findings of Kalpana et al (1997) [12], Chopra et al (1999) [13], and Chetty (2000) [14], Sandeep et al (2012) [15]. Deafness is more common in children and

adolescents. This could be due to a lack of awareness and appreciation for sounds in them. As the youngster grows older, he becomes more aware of his surroundings and takes better care of himself.

Table 3 revealed that males had a higher incidence of both conductive and sensorineural deafness than females. This could be because female youngsters in this area are typically not sent to school in comparison to men. Tuli et al (1988) [17], Sharma et al (1992) [17], and Kalpana et al (1997) [12] made similar observations, as did Chopra et al (1999) [13], Pannu et al (2007) [19], Arora et al (2016) [20], and Dar et al (2017) [21].

There were 192 cases (36.09%) of conductive deafness related to pathology in the external ear and 340 cases (63.90 percent) of hearing loss due to middle ear illnesses. External ear cerumen (wax) was the most common cause, accounting for 20.67 percent of cases. Otomycosis was responsible for 11.27 percent of cases, whereas other causes accounted for 4.13 percent. Similarly, among middle ear diseases, secretory otitis media was the most common, accounting for 37.21 percent of cases. Active CSOM accounted for 15.03 percent, with CSOM (dry) accounting for 5.63 percent. RTM was discovered in 4.69 percent of the instances. Other middle ear disorders were found in 1.31 percent of the cases. The majority of children with hearing loss were between the ages of 5 and 6 years, due to wax (20.83 percent) and otomycosis (14.06 percent) [22, 23, 24, 25]. The lower prevalence of these illnesses in older age groups is most likely due to increased hygiene awareness, such as regular cleaning of the external ear and timely treatment of external ear ailments [26, 27]. As a result, it can be inferred that age has a major influence on the incidence of disorders of the external ear that cause conductive deafness. In this regard, literature is deafeningly silent.

CONCLUSION

Hearing loss among school-aged children in poor countries has been widely documented as a serious health issue. Unfortunately, during normal clinical examinations, school-aged children are rarely evaluated for hearing loss, and most school health authorities make no provision for audiometric screening. This is mainly due to a lack of understanding among parents, school officials, and healthcare practitioners about the repercussions of minor hearing loss. This study found a significant prevalence of hearing loss among school-aged children. Even if these figures are subject to uncertainty, they show that hearing loss is frequent among school-aged children in Sambalpur. The findings are also consistent with other investigations, despite considerable variances in earlier findings. The study also indicated that earwax or otitis was the most common cause of hearing loss. The current study emphasises the critical need to increase school health programs aimed at screening these youngsters for hearing impairment. More research into the impact of aberrant tympanograms and the development of a realistic approach for routine school screening is required.

REFERENCES

1. Acuin J. (2004). Chronic Suppurative Otitis Media. Burden of Illness and Management Options. Geneva: World Health Organization.
2. Alvord, L. S., & Davenport, T. (1992). Reference equivalent threshold levels for the Handtronix, Oto-Screener™. Journal of the Acoustical Society of America, 91, 234-235.

3. Amedofu, G.K., Awuah, P., Ocansey, G., &Antwi, B. (2003). Hearing impairment among secondary school students. *Indian Journal of Clinical Practice (International Edition)*, 4(4), 17-20.
4. Amedofu, G. K., Opoku-Buabeng, J., Osei Bagyina, A. et al., (2003). Hearing loss Among School Children in Ghana. *Ghana Medical Journal*, 37, 148-152.
5. American Speech and Hearing Association (ASHA) (1975). Committee on Audiometric Evaluation: Guidelines for Identification Audiometry. ASHA
6. ASHA (1990). American Speech-LanguageHearing Association, Guidelines for screening for hearing impairments and middle ear disorders, ASHA, 32, 17–24.
7. Kavitha AK, Jose AP, Anurudhan A, Baby JA. Hearing assessment of kindergarten children in Mangalore. *Journal of Clinical and Diagnostic Research*. 2009;3:1261-5.
8. Kalpana R, Chamyal PC. Study of prevalence and aetiology of the hearing loss amongst school going children. *Indian J Otolaryngol and Head Neck Surg*. 1997;49(2):142-4.
9. Rao S, Subramanyam MA, Nair NS, Rajashekhar B. Hearing impairment and ear diseases among children of school entry age in rural South India. *International Journal of Pediatric Otorhinolaryngology*. 2002;64:105-10.
10. Taha AA, Pratt SR, Farahat TM, Zein A, Albtanony MA, Abdel-Rasoul GM, et al. Prevalence and risk factors of hearing impairment among primaryschool children in Shebin El-Kom District, Egypt. *American Journal of Audiology*. 2010;19:46-60.
11. Chen Y, Li X, Xu Z, Li Z, Zhang P, He Y, et al. Ear diseases among secondary school students in Xi'an, China: the role of portable audio device use, insomnia and academic stress. *BMC Public Health*. 2011;11:445.
12. Bennet KE, Haggard MP. Accumulation of factors influencing children's middle ear disease: risk factor modelling on a large population cohort. *Journal Epidemiol Community Health*. 1998;52:786-93.
13. Noorhassim I, Rampal KG. Multiplicative effect of smoking and age on hearing impairment. *American Journal of Otolaryngology*. 1998;19(4):240-3.
14. Kapur, Y. P. (1965). A study of hearing loss in school children in India. *Journal of Speech and Hearing Disorders*, 30 (3), 225-233.
15. Kumar, S., D'Mello, J. (2006). Identifying Children At-Risk For Speech and Hearing Disorders. A Preliminary Survey Report from Hyderabad, India.
16. Rao, R. S. P., Subramanyam, M.A., Nair, N. S., &Rajashekhar, B. (2002). Hearing impairment and ear disease among children of school entry age in rural South India. *International Journal of Pediatric Otorhinolaryngology*, 64, 105-110.
17. Shaheen, M., Raquib, A. and Ahmad, S.M. (2011). Chronic Suppurative Otitis Media and its Association with Social Economic Factors Among Rural Primary School Children of Bangladesh. *Indian Journal of Otolaryngology in Head and Neck Surgery*, 64, 36-41.
18. Siddartha, Bhat, V., Bhandary, S. K., Shenoy, V. and Rashmi. (2011). Otitis media with effusion in relation to socio economic status: a community based study. *Indian J Otolaryngol Head Neck Surg*, 64(1), 56-58.
19. Verma AK, Vohra A, Maitra A, Banarjee M, Singh R, Mittal SK, et al. Epidemiology of chronic suppurative otitis media and deafness in a rural area and developing an intervention strategy. *Indian J Pediatr*. 1995;62:725-9.

20. Mann SBS, Sharma SC, Gupta AK, Nagarkar AN, Dharamvir. Incidence of hearing impairment among rural and urban school going children; a survey. *Indian J Pediatr.* 1998;65:141-5.
21. M. Kırıs, T. Muderris, T. Kara, S. Bercin, H. Cankaya, and E. Sevil, "Prevalence and risk factors of otitis media with effusion in school children in Eastern Anatolia," *International Journal of Pediatric Otorhinolaryngology*, vol. 76, no. 7, pp. 1030–1035, 2012.
22. M. Mahadevan, G. Navarro-Lochin, H. K. K. Tan et al., "A review of the burden of disease due to otitis media in the Asia-Pacific," *International Journal of Pediatric Otorhinolaryngology*, vol. 76, no. 5, pp. 623–635, 2012.
23. S. Chadha, A. Sayal, V. Malhotra, and A. Agarwal, "Prevalence of preventable ear disorders in over 15 000 schoolchildren in northern India," *Journal of Laryngology & Otology*, vol. 127, no. 1, pp. 28–32, 2013.
24. G. Yamamah, A. Mabrouk, E. Ghorab, M. Ahmady, and H. Abdulsalam, "Middle ear and hearing disorders of schoolchildren aged 7–10 years in South Sinai, Egypt," *Eastern Mediterranean Health Journal*, vol. 18, no. 3, pp. 255–260, 2012.
25. V. Yiengprugsawan, A. Hogan, and L. Strazdins, "Longitudinal analysis of ear infection and hearing impairment: findings from 6-year prospective cohorts of Australian children," *BMC Pediatrics*, vol. 13, no. 1, article 28, 2013.
26. M. Wake and Z. Poulakis, "Slight and mild hearing loss in primary school children," *Journal of Paediatrics and Child Health*, vol. 40, no. 1-2, pp. 11–13, 2004.
27. L. Sliwa, S. Hatzopoulos, K. Kochanek, A. Piłka, A. Senderski, and P. H. Skarzyński, "A comparison of audiometric and objective methods in hearing screening of school children. A preliminary study," *International Journal of Pediatric Otorhinolaryngology*, vol. 75, no. 4, pp. 483–488, 2011.