Original Article

Milan Maharjan[1], Mana Shrestha[1], Rosy Bajracharya[1]

[1]Ear Care Nepal, Sanepa, Lalitpur, Nepal

Corresponding Author
Milan Maharjan, Ear Care Nepal, Sanepa, Lalitpur, Nepal

Telephone: 00977-9851014876

Email: earcarenepal@gmail.com

OTOSCOPIC FINDINGS AMONG SCHOOL-AGED NEPALESE CHILDREN: EVIDENCE FROM SCHOOL-BASED EAR SCREENING PROGRAMS

ABSTRACT

Aims and Objectives: The objective of this study is to determine the common ear pathologies in Nepalese school aged children.

Methods: This was a retrospective study carried out by reviewing the medical records of the school-based ear health screening programs conducted in 2015 through 2019. The demographic data like age and gender along with clinical data like findings of ear examination were obtained and analyzed. Statistical analysis of the data was done using frequency and percentage.

Results: Records of 79,340 children were analyzed. 61.70% (n=48,947) of children had normal otoscopic findings whereas 38.30% (n=30,393) had various ear pathologies. Of those children with ear pathologies, 50.40% (n=15,321) were male and 49.60% (n=15,072) were female. Impacted wax was the most common otoscopic finding affecting 28.41% (n=22,539) children, followed by middle ear pathologies in 9.31% (n=7,393) and external ear pathologies in 0.58% (n=461) children.

Conclusion: This study shows high prevalence of ear pathologies in school age Nepalese children. It also highlights that the implementation of initiatives for screening of ear disease and hearing status using tools like otoscope and audiometer at the time of enrollment of children into school is beneficial. This would be an effective measure for early detection and treatment of ear diseases and to prevent avoidable hearing loss in Nepal.

Keywords: Children, ear disease, otitis media

INTRODUCTION

Ear disease in children is a significant, yet highly neglected public health problem in developing countries like Nepal. Chronic Otitis Media (COM) is the most commonly seen ear disorder in Nepal.[1-4] In general, ear diseases are more frequent than nose and throat disorders in most otorhinolaryngological clinics.[5-7] Despite their prevalence, ear diseases are often overlooked and complications such as brain abscess and meningitis are still frequent in developing countries.[8] Chronic otitis media is also the main cause of avoidable hearing loss in developing countries.[9] In children, more than 60% of hearing loss is due to avoidable causes that can be prevented through implementation of public health measures. Hearing loss in children can impair speech development and educational progress causing significant impact in life.[10, 11]

Hearing screening programs are rarely part of the routine screening programs in developing countries. Here, the majority of children with ear diseases go undiagnosed mainly due to lack of awareness among parent and lack of access to expert care. Studies suggests that school entrance hearing screening by trained health workers, using simple otoscopic examination can prevent hearing loss caused by diseases like COM.[12,13] The World Health Organization (WHO) suggests that school based hearing screening and school entry programs are key factors in early detection, referral and timely management of common ear diseases to prevent avoidable hearing loss.[14]

The studies detailing various ear diseases prevalent in children are lacking in Nepal. This study was done to find out the pattern of ear diseases commonly seen in school-aged children in Nepal. The findings of our study could inform policy makers the actual status of ear health in school going children and importance of screening measures for timely detection.

METHODS

This was a cross sectional study conducted by reviewing the medical records obtained during school based ear health programs conducted by Ear Care Nepal at government schools in different parts of Nepal between 2015 and 2019. The study received ethical approval from the ethical review committee of Nepal Health Research Council. Medical data were retrieved from the screening pro-forma of children from grade 1 through grade 10. The clinical screening of

the ear and documentation of the findings was carried out by senior physicians associated with Ear Care Nepal. The relevant clinical data from findings of external ear, external auditory canal and tympanic membrane examination along with diagnosis of ear disease and demographic profile as detailed in the screening records were extracted. The records with incomplete data were excluded from the study. Statistical analysis of the data was done using frequency and percentage.

Screening procedures during school based ear health programs were conducted with standard protocol. The external ears were initially examined using a head light. Details of the external auditory canal and the tympanic membrane were confirmed by otoscopic evaluation. Earwax was diagnosed as a presence of wax preventing the view of the tympanic membrane. Children with red, congested and bulging tympanic membranes, with or without perforation were diagnosed as acute otitis media (AOM). Otitis media with effusion (OME) was diagnosed when the tympanic membrane was bluish, thickened, dull, and lusterless with loss of cone of light. Suspected cases of OME were reconfirmed by tympanometry. Chronic otitis media was diagnosed when there was permanent abnormality of the pars tensa or pars flaccida, with or without ear discharge.

RESULTS

A total of 79,340 children with complete records were included in the study. Out of 79,340 children, 48.55% (n=38,516) were male and 51.45% (n=40,824) were female. About 61.70% (n=48,947) of the children had normal ear findings, whereas 38.30% (n=30,393) had various ear pathologies. Among the 30,393 children with pathological ear findings, 50.40% (n=15,321) were male and 49.60% (n=15,072) female. The most common otoscopic findings were impacted wax, prevalent in 28.41% (n=22,539) children, followed by otitis media observed in 9.31% (n=7,393) and external ear pathologies in 0.58% (n=461) children. Otoscopic findings of the children by age group are documented in Table 1.

Out of 9.31% (n=7,393) children found to have otitis media, chronic otitis media was the most commonly observed type of otitis media. This was seen in 8.04% (n=6,382) of the total children screened. Types of otitis media by age distribution are shown in Table 2.

Table 2. Age distribution of children with types of otitis media

Age distribution	Number of children with otitis media (%)	Number of children with types of otitis media (%)	
<5 years	453 (6.13%)	ASOM	129 (28.48%)
		OME	78 (17.22%)
		COM	246 (54.30%)
5-10 years	1613 (21.81%)	ASOM	250 (15.50%)
		OME	143 (8.86%)
		COM	1,220 (75.63%)
11-15 years	4234 (57.27%)	ASOM	213 (5.03%)
		OME	154 (3.64%)
		COM	3867 (91.33%)
>15 years	1093 (14.78%)	ASOM	23 (2.10%)
		OME	21 (1.92%)
		COM	1049 (95.97%)
Total	7,393 (100%)		

Abbreviations: ASOM, acute suppurative otitis media; OME otitis media with effusion; COM chronic otitis media.

Table 1. Age distribution of children with ear findings

Age distribution	Number of children examined (%)	Number of children with ear pathologies (%)	Number of children with ear findings (%)	
<5 years	8,030 (10.12%)	4,649 (15.30%)	Normal	3,381 (42.10%)
			Wax	4,172 (51.96%)
			External ear pathology	24 (0.30%)
			Middle ear pathology	453 (5.64%)
5-10 years	21,514 (27.11%)	10,303 (33.90%)	Normal	11,211 (52.11%)
			Wax	8,430 (39.18%)
			External ear pathology	260 (1.21%)
			Middle ear pathology	1,613 (7.50%)
11-15 years	39,580 (49.89%)	12,982 (42.71%)	Normal	26,598 (67.20%)
			Wax	8,628 (21.80%)
			External ear pathology	120 (0.30%)
			Middle ear pathology	4,234 (10.70%)
>15 years	10,216 (12.88%)	2,459 (8.09%)	Normal	7,757 (75.93%)
			Wax	1,309 (12.81%)
			External ear pathology	57 (0.56%)
			Middle ear pathology	1,093 (10.70%)
Total	79,340 (100%)	30,393 (100%)		79,340 (100%)

Pathology of the external ear was found to be less frequent than middle ear pathology as shown in Table 3.

Table 3.Types of external ear pathology

External ear pathology	Number of children (%)
Myringitis	92 (19.96%)
Acute otitis externa	94 (20.39%)
Otomycosis	35 (7.59%)
Foreign body	216 (46.85%)
Osteoma	9 (1.95%)
Microtia	9 (1.95%)
Anotia	4 (0.87%)
Keloid of pinna	2 (0.43%)
Total	461 (100%)

DISCUSSION

This is the first large scale epidemiological study conducted to determine the pattern of ear diseases in school age children in Nepal. The few studies available in the literature about the prevalence of ear diseases in children either have studied small cohorts or are the results of a hospital-based study, which do not reflect the true prevalence in the country. Our study fills this gap by providing recent findings in a large cohort and suggests that a considerable burden of ear diseases still exists in children. Out of 79,340 children included in this study, 38.30% (n=30,393) of the children had otological disorders, which is a major public health issue. In pediatric otolaryngological outpatients, otological disorders are far more common than nose and throat disorders, and chronic otitis media is the commonest of all.[5-7] Despite being highly prevalent, ear diseases are often neglected. In Nepal the prevalence of ear pathologies are reported between 36.09%- 81.6%.[2,4,7,15] Relatively higher prevalence reported by Adhikari et al.[15] (81.6%) and Sigdel et al.[7] (57.84%) could be because these studies were based on health camps or were hospital-based where the concentration of clinical findings are higher, whereas, Thakur et al.'s[4] study and ours are school-based. In these studies, all the children present on the day of screening were examined and not only those who complained of ear problems. In other parts of the globe, ear disorders have been reported as; India 14.8%,[16] Egypt 27.5%,[17] Brazil 22.8%,[18] Tanzania 27.7%, [19] and Nigeria 20.9%[20] . Phanguphangu et al.[21] and Rathnaraajan et al.[22] reported relatively high prevalence of ear diseases in South Africa and South India respectively.

Although higher male preponderance has been observed in other studies[2, 6, 7, 23] and while we did notice a slightly higher rate in female children, we did not notice significant gender preponderance. This could be because distribution of girls and boys were almost equal in the total population we studied. In our study, ear pathologies were most prevalent in younger children, and the prevalence rate decreased with increasing age. This can be attributed to factors such as poor eustachian tube function, recurrent upper airway infections, and the fact that younger children are the most vulnerable as they are completely dependent on others and are unaware about their problems. Other studies also suggested that younger children suffered more with ear disorders than their older peers.[2, 7, 21-24]

Earwax was the commonest otoscopic finding observed in our study 28.41% (n=22,539), which is supported by other studies.[2,4,7,15,19-21] Few studies did not find earwax as a common otoscopic finding.[5,23] The high prevalence of earwax could be because it rarely causes discomfort, therefore, very few pursue medical help for it. Because routine school screening programs do not exist in Nepal for the detection and management of earwax, this would likely be missed. Wax impaction is mostly asymptomatic, but it is often regarded as a common cause of avoidable hearing loss.[13,19,20,22] Hearing loss caused due to wax impaction is slowly progressive in nature, therefore, rarely complained of by children and often overlooked by their parents.

In our study, otitis media was seen in 9.31% (n=7,393) children. Prevalence rates of 3.5% have been detected in Korea,[24] 7.26% in Malaysia,[25] 7.82% in India,[22] 10.07% in Brazil,[26] 5.8% in Rwanda,[27] and 13.2% in another study conducted in Nepal.[3] The burden of otitis media is reported to be particularly high in the poorest countries.[28]

Chronic otitis media was the commonest type of otitis media seen in this study, found in 8.04% (n=6,382) children. Similar prevalence rates to ours were also quoted by Little et al. 7.4%,[1] Maharjan et al. 10.83%,[29] and Thakur et al. 7.73%,[4] but lower prevalence rates were reported by Chadha et al. 4.79%,[30] Adhikari et al. 5.7%,[2] Rathnaraajan et al 5.51%[22] and Mukara et al 4%.[27] High prevalence of COM has been reported by hospital based and free health camp based studies.[7,23] Chronic otitis media is more commonly seen in developing than developed countries. [31,32] One of the highest prevalence rates of COM was reported in Greenlandic children[33] and the Inuit population.[34] Apart from risk factors like poor nutrition and hygiene; overcrowding, passive smoking, limited access to health care, and racial and genetic factors have contributed to the increased prevalence rate of COM in these populations. Chronic otitis media is considered by most studies to be the main cause of persistent conductive hearing loss in children.[1, 18, 23, 28, 29, 32]

In this study, chronic otitis media with perforated tympanic membrane without cholesteatoma was more commonly detected than the cases with cholesteatoma. This is consistent with the findings of other studies.[2,3,7,23,30,32] We could not find a satisfactory explanation for this fact. We speculate that one of the factor could be due to misdiagnosis of early cases of cholesteatoma as a safer type of otitis media because middle ear findings were confirmed by

otoscopic examination only. Further investigations such as microscopic evaluation, oto-endoscopy to detect early cases of cholesteatoma were out of scope of this study.

Otitis media with effusion and acute otitis media were the least common type of otitis media found in our study, accounting for 0.77% and 0.50% respectively of the total children screened. This is comparable to the results of other studies.[2,7,22,23] Majority of children were above five years of age in our study, which could be one of the factors for low prevalence of AOM and OME. Other contributing factors could be genetic and racial, however further studies are needed to consider these factors.

Acute otitis media rarely receives medical attention in most parts of Nepal, because in AOM, brief periods of earaches is usually followed by ear discharge and can go into a chronic phase if neglected. Ear discharge is mostly treated at home in under-privileged rural communities by unscientific measures like instillation of oil and herbal drops inside the ear, and use of ear drops without prescriptions. This is the reason why, the prevalence rates of COM in this study increased steadily with increasing age of the children. Contrary to this, AOM and OME steadily declined with increasing age of the children. A study by Thakur et al. encountered higher prevalence of OME and AOM than chronic otitis media.[4] This could be because the diagnosis was confirmed with the clinical findings only and tympanometry was not done to confirm the cases of OME. Contrary to our findings, a study conducted in Egypt found OME as the commonest type of otitis media and COM the least common.[17]

Foreign bodies like wood sticks, beans, insects, grains, pencil erasers and cotton bud tips were among the most common objects seen in the external auditory canals of 216 children. Most of the foreign bodies were found to be buried around the earwax, suggesting long time impaction. This implies ear examination was not carried out routinely. The detection of higher numbers of foreign bodies on the canals examined in our study could be because children included in this study are from rural areas who are exposed to outdoor activities resulting in accidental entry. Other external ear problems like otitis externa, otomycosis and osteoma were less commonly detected. Congenital deformities like anotia and microtia was seen in 4 and 9 cases respectively. Correct treatment and awareness about common external ear diseases plays a key role in preventing hearing loss in countries where practices like the application of oil and traditional herbs are commonly used to treat ear problems. These traditional practices are common predisposing factors for more severe middle ear infections.

One of the main limitations of our study was the inability to collect data on tympanic membrane findings in children with earwax impaction. We believe the prevalence of middle ear diseases could be higher in this study population if earwax were removed and re-examination was carried out following wax removal. Although some attempts were made to remove earwax in children with soft and partial impaction of wax, it was not feasible to remove wax of all children due to the lack of resources required to carry out the procedure at the time of screening. In addition, as this is a retrospective study, the study team had to rely on the data documented at the time of the school ear health program.

Despite improvements in health care facilities in last two decades in Nepal, ear disorders such as chronic otitis media remain prevalent. To prevent avoidable hearing loss in children, there is an urgent need for the early detection and timely management of ear diseases, especially, chronic otitis media. This can be achieved by conducting school entrance and regular school-based ear and hearing screening, highlighting the need for integration of an ear and hearing care program into the country's national health policy and raising public awareness about incorrect traditional practices used to treat ear diseases.

CONCLUSION

This study suggests that ear diseases are still more prevalent in Nepalese children than in children from other developing countries. There is an urgent need to develop a national level health program focused on ear care. The early detection and management of chronic otitis media can reduce the burden of hearing loss. This study highlights the need for school entrance and routine school-based ear screening, and awareness and ear health education programs to timely detect ear diseases and prevent avoidable hearing loss in Nepal.

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