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Original Research Article

Prevalence of hearing loss among preschool children in Hanoi, Vietnam

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ABSTRACT

Background: Hearing loss in children is a common entity worldwide. This study examined the prevalence of hearing loss among preschool children in Hanoi, Vietnam.
Methods: A cross sectional was conducted among pre-schoolers aged 2-5 years in Hanoi, Vietnam to determine the prevalence of hearing loss according to the method recommended by the Joint Committee on Infant Hearing (JCIH): a two-step Automated Oto-Acoustic Emissions (AOAE) program, completed by an Auditory Brainstem Response (ABR) for the positive diagnosis of hearing impairment.
Results: In total, there were 7,191 preschoolers and kindergarten screened. Three hundred and thirty-seven (4.7%) of children screened failed and were referred for further testing. The percentage of children with true hearing loss was 4.4% confirmed by ABR test. Majority of the hearing loss children was conductive hearing loss (70.4%). Mild hearing loss (21–≤40 dB) accounted for almost half of the children with hearing loss.
Conclusions: This study provides the first estimates of audiometrically measured hearing loss prevalence among preschool children in Hanoi, Vietnam. The study found that hearing loss is common among pre-primary school children in the country. Routine hearing screening of school-age children should be included in annual school health programs in Vietnam.

Keywords: Hearing impairment, Hearing loss, Preschool children, Vietnam

INTRODUCTION

Hearing loss is now an important public health problem globally. It is one of the most common developmental disorders.[1] According to estimates of the World Health Organization (WHO), 460 million people worldwide have disabling hearing loss, and 34 million of these are children. It is projected that by 2050 over 900 million people will have disabling hearing loss.[2] A meta-analysis used data from 42 studies in 29 countries found that South Asia was highest prevalence of hearing loss among children aged 5-14 year (≥35 dB) (2.2%).[3] The majority of people with disabling hearing loss live in low- and middle-income countries. The WHO estimates that 60% of hearing loss is primarily preventable, whereas the remaining can be readily be addressed by secondary or tertiary prevention.[4]

The definition of hearing loss may vary in different classification systems but usually categories of hearing loss are mild (21-40 dB hearing loss), moderate (41–70 dB hearing loss), severe and profound (>70 dB hearing loss).[5] Thresholds are expressed in dB on the hearing level scale (dB HL). In terms of type, hearing loss in children can be classified as sensorineural, conductive, and mixed type. Sensorineural hearing loss results from failure to transduce vibrations into neural impulses in the cochlea and is found mainly in very preterm infants. Conductive hearing loss results from interference with the transmission of sound through the external and

middle ear and is much more common in infants. Mixed hearing impairment is a combination of the sensorineural and conductive hearing loss types.[5]

Hearing loss has important effects on academic achievement, language development, communication difficulties, and stigmatization.[4,6,7] Early identification of hearing loss followed by a timely and effective intervention is necessary to minimise its negative effects on the development of cognition, psychological and verbal communication skills.[4]

The Joint Committee on Infant Hearing urged that comprehensive audiological assessment should be provided to children with hearing impairment at or before 3 months of age and appropriate intervention commence by 6 months of age.[8] However, many developing countries, including Vietnam, encounter barriers in launching early hearing screening programs and follow-up services due to a higher priority for life-threatening diseases, unaffordable costs and a lack of human and material resources.

Knowledge on hearing loss in Vietnam is limited. It is estimated that 180,000 children under 18 have hearing loss in Vietnam. In fact, those number could be higher due to limited hearing screening programs in the country.[9] Recently, Vietnam has started providing education and resources to professionals, teachers, and families who work with or have hearing loss children.[9]

In Vietnam, there is a lack of published research which focuses on the hearing disability situation, and characteristics of hearing loss among children. There are no national universal hearing screening program, leading to a shortage of awareness to address the issue in the country.[10]

This study was to determine the prevalence of hearing loss among preschool children in Hanoi, the capital city of Vietnam. This may also draw the attention of all stakeholders to the challenges encountered in the management of hearing-impaired children.

METHODS

In this study, 7,191 pre-school children aged 2-5 years in 5 districts of Hanoi, including Ba Dinh, Tay Ho, Hoang Mai, Dong Da and Thanh Xuan, from June 2011 - November 2012, were tested for hearing loss.

Inclusion criteria

Preschool children aged from 2 years (24 months) to 5 years (60 months) at the time of screening day attending the public pre-primary schools in the 5 studied districts were invited into the study.

Exclusion criteria

Preschool children had ear infection, otitis media on the day of screening was excluded.

Hearing screening measurements

The hearing screening according to the method recommended by the Joint Committee on Infant Hearing8, consisting of three steps:[8]

- Detection of bilateral Automated Oto-Acoustic Emission (AOAE).
- For children which the test was positive in one or both ears, a second AOAE test was performed, at the earliest 2 days after the first test.
- If the second AOAE test was positive for one or both ears, children were referred to the audiological centre at the National Hospital of Pediatrics, Hanoi for auditory brainstem response (ABR) performance within 4 weeks.

AOAE were tested during children' natural sleep. For presence of AOAE the response was PASS, and FLACK when absent. ABR took place within the audiology laboratory of the National Hospital of Pediatrics in Hanoi. Hearing loss was classified as mild (21-40 dB HL), moderate (41-70 dB HL), severe and profound (>70 dB HL). All tests were performed by qualified bio-medical staff in the Department of ENT, National Hospital of Pediatrics, Hanoi. Collected data were entered and managed by Epi-data software and was analysed using SPSS 20.0.

RESULTS

In total 7,191 preschool children aged 2 to 5 years (boys: 3,765; girls: 3,426) were screened for hearing loss.

Figure 1 shows the flowchart for hearing loss screening. After the first AOAE test, 6,854 (boys: 3,576; girls: 3,278) had Pass result, and 337 (4.7%) (boys: 189; girls: 148) tested positive (Figure 1). All of them were undertaken second AOAE test, of which: 334 children (4.4% of the screened population) again tested positive.

Those children (334) were tested for ABR. The ABR test found that all of those children were abnormal, accounting 4.4% of the screened population. Most often children were diagnosed with conductive hearing deficit in 221 (70.4%), whereas sensorineural hearing deficit was identified in 40 (12.7%) and mixed type in 53 (16.9%) of them (Figure 1).

Figure 2 reports the prevalence of hearing loss among preschool children in Hanoi, Vietnam according age. The study found that hearing loss prevalence was highest among 2 year children (7.9%) followed by 3 year children (5.4%), and lowest among 4 and 5 year children.

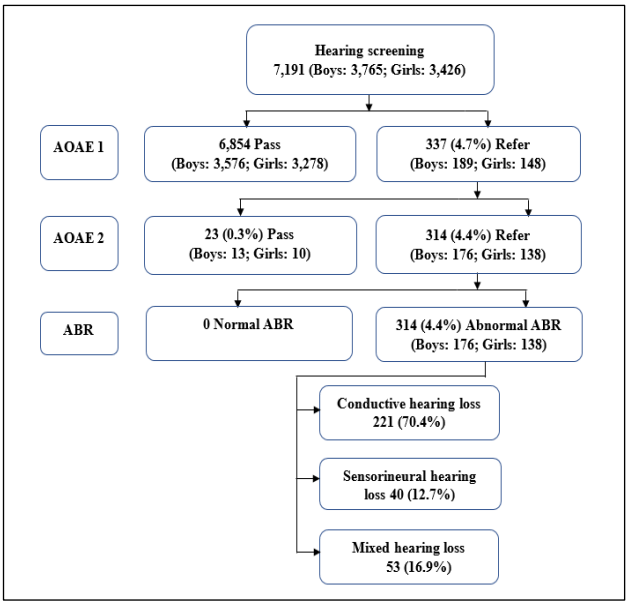

Figure 1: Hearing loss screening.

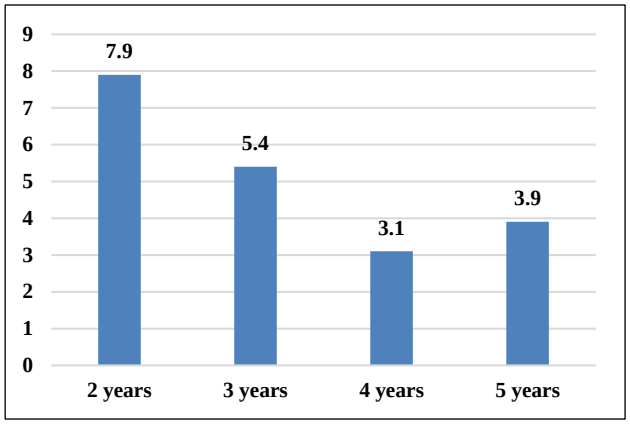

Figure 2: Prevalence of hearing loss among preschool children in Hanoi, Vietnam according age (n=7191).

Table 1: Severity of hearing loss in children who failed school screening examinations in Hanoi, Vietnam (n=314).

Degree of hearing loss	Boys n (%)	Girls n (%)	Total n (%)
Mild hearing deficit (21 - ≤ 40 dB)	80 (45.5)	64 (46.4)	144 (45.9)
Moderate hearing deficit (41-70 dB)	73 (41.5)	58 (42.0)	131 (41.7)
Severe hearing deficit (>70 dB)	23 (13.1)	16 (11.6)	39 (12.4)

Table 1 demonstrates that among children with the diagnosis of hearing loss, 144 (45.9%) were diagnosed with mild (up to 40 dB hearing loss) and 131 (41.7%) with moderate hearing loss (41-70 dB hearing loss), and severe and profound hearing loss (>70 dB hearing loss) was identified in 39 (12.4%).

DISCUSSION

The best of authors knowledge, this study provides the first estimates hearing loss prevalence among pre-school children in Vietnam. The standard method for hearing loss screening according recommended by the Joint Committee on Infant Hearing was applied. The study showed that 4.4% of preschoolers in Hanoi have hearing loss in different levels and types.[8] This prevalence is comparable with hearing loss prevalence among less than 5-year children in Nigeria[11]. However, higher prevalence rate was reported by studies in other countries.[12-14]

This screening program applied the method recommended by the Joint Committee on Infant Hearing[8] which is a global approach to paediatric hearing loss.[15-18] AOAE is fast and easy to use for infant children, non-invasive, and highly sensitive and reproducible. The main disadvantage of AOAE, however, it is not capable of detecting retro cochlear deafness to which newborns at risk are susceptible.[19] As a result, screenings now include an automated ABR test, which marginally longer and slightly more expensive than AOAE.[20]

Advocates of screening for hearing loss in school-age children have pointed out that mild hearing loss (20 to 40 dB) may be missed in infancy because universal newborn hearing screening methods are less sensitive to hearing loss below 40 dB.[21] Previous studies found that many children passed newborn screenings but were later identified as having hearing loss in the preschool or school-age period.[22, 23]

The majority of 2-5-year children with absent AOAEs likely had conductive hearing loss. Nonetheless, this type of hearing loss which can be asymptomatic, may become permanent if left untreated. Future research will benefit from analyses, which includes the slight hearing loss category, for which there is growing support, and from studies that identify factors contributing to hearing loss in this population.

In children with moderate to severe hearing impairment, the disorders are identified early while in children with mild or unilateral hearing impairment often goes unnoticed and detected late. Given the high proportion of mind hearing loss among pre-schoolers 45.9% (21-≤40 dB), early hearing screening is very important for Vietnamese preschool children.

Vietnam has no universal national hearing screening program for newborn and children at the present. In addition, there is no routine hearing screening of children in majority of health institutions in the country. Major hospitals in both Hanoi and Ho Chi Minh City now conduct newborn hearing screening programs for at-risk children, which only addresses approximately half of the

entire population of babies with hearing loss. Recently, with the support of the Ministry of Health and local department of health in Hanoi, Ho Chi Minh City, and some provinces nearby Hanoi hearing loss screening have been done for newborn in some maternity hospitals in those provinces. Findings from the currently study provide scientific evidence, and support Vietnam Ministry of Health to promptly set up a national universal newborn hearing screening.

CONCLUSION

Hearing loss among preschool children is common in Hanoi, Vietnam. National universal hearing loss programs for newborn, and preschool children is strongly recommended to reduce the age of identification of hearing loss in the children in Vietnam. Data obtained from the suggested programs need to be collected and analysed for further health research and intervention as well as policy making in the country.

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

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