

# Ear and Hearing Disorders in Representative Sample of Grade-one School Children in Phayao Municipality

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## Abstract

The objective of this survey research was to find out the prevalence and cause of hearing impairment among children of school-entry age, in the municipal area of Amphoe Mueang Phayao. This research included 399 children studying in the first year of government school in municipal area. They were examined using otoacoustic emissions and otoscopy. Children with ear disease or hearing impairment were re-examined to find out the type of hearing impairment and treatment. The data were presented in terms of means and percentage.

The result showed that impacted wax was found to be the most common cause of ear disease (24.8%) and hearing impairment was detected in 8 children (2%). On retesting, it was predominantly sensory neural hearing loss, observed among 6 out of the 8 children.

Hearing screening programe in Thailand should be concerned about early detection and management of common ear disease and hearing impairment and to promote self hygiene practice for ears among school children.

**Key words:** ear disease, hearing loss, school children, Phayao

## Introduction

Hearing loss can cause significant emotional and social problems. It also has a negative impact on verbal language, reading, writing and academic performance. A loss of any type or degree can present a barrier to incidental learning. Research from auditory deprivation studies indicates that the earlier identification and habilitation occur, the greater will be the level of speech production and linguistic competence achieved by children during their early life.<sup>(1)</sup>

Unilateral hearing losses have implications for auditory and psycho-linguistic skills, education progress, communication and classroom behaviour.<sup>(2)</sup> Conductive hearing losses, on the other hand, may have long-term effects on the language and intellectual development of a child, as well as a considerable personal impact.<sup>(3)</sup>

The World Health Organization (WHO) suggests that, in developing countries, children should be screened at school entry using a simple audiometer

and the external ear be inspected for the presence of discharge, to study the extent of the problem in the community.<sup>(4)</sup>

In Thailand as a developing country, hearing screening programs for pre-school and school-age children lack uniformity and comprehensiveness. There are few documented studies of prevalence of hearing impairment and related ear pathologies in school children. Therefore this study was done to determine the prevalence of ear disorders and hearing impairment in first year entry school children in Phayao municipality.

### Methods

This is a cross-sectional survey study among 399 first year school children from all seven government schools in the municipal of Amphoe Mueang Phayao in the time period December 2009 - January 2010. Children who were absent were excluded. Otoscopy was performed following the removal of ear wax and the presence of liquid, opacity, retraction, perforation or erythema were noted in all children. Impacted ear wax was considered when ear wax covers the whole of the external auditory canal and the tympanic membrane was not visible at all. Chronic suppurative otitis media implies a permanent abnormality of the par tensa or par flaccid. Cases were diagnosed as otitis media with effusion if there was visible retraction and change in colour of the tympanic membrane and its mobility on pneumatic otoscopy. Acute otitis media was diagnosed with either history of earache, fever; impaired hearing or otorrhea and examination of tympanic membrane showing intensely red or bulging or perforation.

After otoscopy, hearing screening was conducted individually in the quietest location within the school (eg. the library or sound laboratory room). The children were pulled out of their classes for screening procedures, rather than during breaks, because the noise

levels in the schools during breaks were relatively high. An otoacoustic emissions (OAE) instrument was used for hearing screening tests and was automated for “pass” or “refer” results. The children who did not pass the hearing screening were referred for diagnostic audiologic assessment by an audiological scientist at the department of Ear Nose Throat (ENT) Phayao hospital. The parents were informed of the referral. For confirmation of hearing loss, both air and bone conduction hearing threshold testing was done under earphones in a sound-proofed room. Hearing loss was recorded as sensorineural, conductive, or mixed. A sensorineural loss was considered if thresholds were elevated and any gap between bone and air conduction results was  $\leq 5$ dB. A hearing loss -HL was classified as conduction if an air-bone gap of 10dB or greater was found at any frequency in the presence of normal bone conduction thresholds, and a mixed hearing loss was considered when an air-bone gap of 10dB or greater was found at any frequency present but bone conduction thresholds were elevated. Hearing loss severity was based on pure-tone average of the hearing thresholds obtained at 500, 1000 and 2000 Hz and was classified according to Katz J, 1985.<sup>(5)</sup> If average hearing thresholds exceeded 25dB HL then the loss was classified as mild (26-40dB HL), moderate (41-55dB HL), moderately severe (56-70dB HL), severe (71-90dB HL) or deafness (>90dB HL).

The data included general information (name, sex, age), otoscopic examination and otoacoustic emissions results were used to calculate means and percentage.

### Results

The total number of children assessed and screened was 399, 194 were female and 216 male. The age ranged between 5.10 and 11.8 years (mean 6.9). (Table 1) The most common ear diseases were wax (24.8%), followed by otitis media with effusion (2.3%)

**Table 1** General information of first school children.

School	Number of first school children				Mean Age (Years)
	Total	In study	Male	Female	
Municipality school I	56	51	26	25	6.4
Municipality school II	10	10	6	4	6.8
Municipality school III	30	30	17	13	7.6
Municipality school IV	34	34	19	15	6.5
Municipality school V	18	17	10	7	6.6
Municipality school VI	15	14	7	7	7.4
Kindergarten school	245	243	126	117	6.7
<b>Total</b>	<b>401</b>	<b>399</b>	<b>216</b>	<b>194</b>	

and acute otitis media (0.5 %). Over all otologic problems were present in 27.8 percent of children. (Table 2)

Of the 399, 41 children (10.3%) failed the hearing screening by OAE, one of them had otitis media with effusion. This children's parents were informed of the referral for confirmation of hearing loss at ENT department Phayao hospital, but three children lost follow up. From 38 children who were undergoing diagnostic audiometry, 30 had normal hearing. Of the three in the thirty children with normal hearing in average threshold, one had unilateral low frequency sensorineural loss (SNHL) and two had unilateral high frequency loss. The prevalence rate of hearing loss was found to be 21.1 percent(8/38) upon comprehensive diagnostic audiometric testing of children with positive screening result.

In the eight children with confirmed hearing loss in average threshold by diagnostic audiometry, two had mixed hearing loss and six had sensorineural loss. Two in the six children with sensorineural loss had bilateral loss. Type of hearing loss and severity are illustrated in Table 3.

## Discussion

Ear disease is one of the major public health con-

**Table 2** Pattern of ear diseases in children

Ear disease	Number of children	Percentage
Wax	99	24.8
Otitis media of effusion	9	2.3
Acute otitis media	2	0.5
Acute otitis externa	1	0.25
Microtia	1	0.25
Squamous papilloma at external auditory canal	1	0.25
Normal	288	72.2

Note: Some children had more than one problem per person

cerns in developing countries. This study indicates that ear diseases and hearing in school children is a considerable burden in Thailand. Wax was the most common ear disease in grade one school children in the municipality of Phayao. It is not surprising that wax (24.8%) in this study was common because in the majority of cases it was asymptomatic and therefore not an indication for seeking medical care or attending hospitals.<sup>(6)</sup> Hatcher et al<sup>(6)</sup>, Mann et al<sup>(7)</sup>, Elango et al<sup>(8)</sup>, Minja et a<sup>(9)</sup>, R.S. Phaneendra Rao et al<sup>(2)</sup>, and Prakash Adhikari<sup>(10)</sup> study reported prevalence rates of impacted ear wax ranging from 8.6 percent to 63 percent. Fairey et al noted that 25 percent

**Table 3** Type and severity of hearing loss (n=8 children)

Type of hearing loss	Severity of hearing loss									
	Mild		Moderate		Moderately severe		Severe		Profound deafness	
	Unilat.	Bilat.	Unilat.	Bilat.	Unilat.	Bilat.	Unilat.	Bilat.	Unilat.	Bilat.
Mixed HL	-	2	-	-	-	-	-	-	-	-
SNHL	2	2	1	-	-	-	-	-	1	-

of children aged 3-10 years had appreciable amount of wax and there was a gradual decline prevalence with age 10.<sup>(11)</sup> This study also revealed that wax is common in younger groups (5-7 years) than other school children. Impacted wax is mostly a silent condition and may not have been attended by the caregivers of the children of school entry age and possibly had influence on hearing. Sharma et al<sup>(12)</sup> and Jacob et al<sup>(13)</sup> studies reported wax as the most common cause of hearing impairment, which accounted for 50 and 29.8 percent of cases respectively.

Otitis media with effusion (OME) is one of the most common causes of hearing impairment and one of the most frequent reasons for elective surgery during childhood in the western world<sup>(13)</sup>. The prevalence of this disease in Thailand is not known. The present study shows that the prevalence in this sample of Phayao school children was 2.3 percent. Studies done in Nepal<sup>(14)</sup> and Nigeria<sup>(15)</sup> revealed that 4.7 percent and 5.3 percent of children had otitis media with effusion.

Chronic otitis media (CSOM) is a major health problem in developing countries. Prakash<sup>(10)</sup>, V. Rupa et al<sup>(16)</sup>, Mharjan et al<sup>(17)</sup>, Ologe and Nwawel<sup>(18)</sup> and Biswas et al<sup>(19)</sup> reported prevalence rates of CSOM ranging from 6 to 13.2 percent, but in this study there was no case of CSOM. The reason may be that the children in this study live in periurban areas where visits to the doctor are more easily than in the above studies.

In Thailand, there is still no natural hearing screening program, so prevalence statistics for hearing loss and deafness are limited. The available data have been limited to hospital and university-based studies. A current Thailand study suggested that the prevalence of hearing loss in Bangkok and rural children were 3.5 and 3.6 percent respectively<sup>(20)</sup>, which is slightly higher than this study.

In developed countries, such as the United States, the prevalence of hearing loss varies from about 0.05 to 17 percent, depending on the age range of the children assessed and the screening methods and failure criteria used.<sup>(21-23)</sup> In developing countries as reported, there also is a great variation in the reported prevalence of hearing impairment in children across locations. For example, one study of school children in India found a rate of 6.3 percent for mild hearing loss in children in an urban school and a rate of 32.8 percent for children in a neighboring rural community.<sup>(24)</sup> In contrast, a similar study of school children in Tanzania observed a higher prevalence in urban children than their rural counterparts-37 percent and 18 percent, respectively.<sup>(25)</sup> In Saudi Arabia, the prevalence of hearing impairment in children has been estimated at 13 percent and in Egypt which has similar ethnic and cultural traditions reported about 20.9 to 24.5 percent.<sup>(26-28)</sup> It is difficult to account entirely for the difference across studies because they might be related not only to the screening procedures and criteria used for identifying hearing impairment but also to health,

socioeconomic, and a host of other extrinsic and intrinsic factors not assessed in these studies or not previously linked to hearing loss.<sup>(26)</sup>

## Conclusion

Hearing is an important sensory perception and is also essential for development of speech function. Hearing screening programmes in Thailand should be considered for early detection and management of common ear diseases and hearing impairment and to promote self hygiene hearing practice among school age children.

Overall, there were prevalence of otologic diseases (27.8%) and hearing impairment (2%) in Grade one primary school children of Phayao's municipality. Although the observed prevalence of ear disease and hearing loss may not reflect exactly the true prevalence in the community, it gives an indication of what may be expected.

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**บทคัดย่อ** โรคหูและภาวะบกพร่องการได้ยินของนักเรียนประถมศึกษาชั้นปีที่ 1 โรงเรียนในเขตเทศบาลเมืองพะเยา  
กนกรส ใ้วจิริยะพันธุ์

กลุ่มงานโสต ศอ นาสิก โรงพยาบาลพะเยา

วารสารวิชาการสาธารณสุข 2555; 21:207-13.

การวิจัยเชิงสำรวจครั้งนี้มีวัตถุประสงค์เพื่อหาความชุกของโรคหูและสาเหตุการบกพร่องการได้ยินของเด็กเริ่มเข้าเรียนในโรงเรียนเขตเทศบาลเมืองพะเยา โดยเก็บรวบรวมข้อมูลจากนักเรียนชั้นประถมศึกษาชั้นปีที่ 1 ของโรงเรียนรัฐบาลทั้งหมดในเขตเทศบาลเมืองพะเยาจำนวน 399 คน เด็กจะได้รับการส่องตรวจหูและตรวจคัดกรองการได้ยิน หากพบเด็กมีความผิดปกติของหู เป็นโรคหูหรือไม่ผ่านการคัดกรองการได้ยินจะได้รับการตรวจซ้ำและรักษาที่แผนกผู้ป่วยนอก หู คอ จมูก โรงพยาบาลพะเยา จากนั้นนำมาวิเคราะห์ข้อมูลโดยใช้สถิติคือ ค่าเฉลี่ย ร้อยละ

การศึกษาพบว่าหูอุดตันเป็นสาเหตุที่พบบ่อยที่สุดของโรคหู(24.8%)พบภาวะการบกพร่องการได้ยินในเด็ก 8 คน (2%) และ 6 ใน 8 คน (75%) เป็นการได้ยินบกพร่องจากประสาทหูเสื่อม

การได้ยินเป็นประสาทสัมผัสที่สำคัญอันหนึ่งที่มีความจำเป็นต่อการพัฒนาด้านการพูดและการเรียนรู้ การตรวจคัดกรองการได้ยินในเด็กวัยเรียนควรได้รับความสนใจ นอกจากเพื่อค้นหาและรักษาโรคของหูตั้งแต่วัยเริ่มแรก เฝ้าระวังและป้องกันการสูญเสียการได้ยินของเด็กแล้ว ยังเป็นการส่งเสริมการดูแลสุขภาพอนามัยของหูด้วยตนเองที่ถูกต้องแก่เด็กนักเรียนอีกด้วย

**คำสำคัญ:** โรคหู, ภาวะบกพร่องการได้ยิน, เด็กนักเรียน, พะเยา