

Ocular morbidity in hearing impaired school children in Eastern Nepal

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Abstract

Background: The association between deafness and ocular problems is well established; however the nature and prevalence of these problems are diverse across the globe.

Objective: The aim of this study is to determine the nature and prevalence of ophthalmologic abnormalities in deaf students and offer treatment to those with remediable conditions.

Method: Eighty seven deaf students aged between six and 25 years were examined in a school for the deaf. The study was cross-sectional and descriptive in nature. The research proforma was developed to collect the data. Data were analyzed using Microsoft Excel.

Results: Twenty-three (26.43%) had some form of ophthalmologic abnormality. Some had anterior segment abnormalities such as corneal opacities (1.14%) and conjunctivitis (4.59%) while others had posterior segment abnormalities like optic atrophy (1.14%), and Ushers syndrome (1.14%). Refractive error was the most common (14.94%).

Conclusion: Since these deaf students use their sight to compensate for the deafness, routine ophthalmologic examination should be carried out on them so that ophthalmologic abnormalities are detected early and treatment offered for remediable diseases

Key words: Deafness, ophthalmologic abnormalities, visual screening

INTRODUCTION

A strong link has been established between the functions of various organs of sensation, particularly between eyes and ears. This is not uncommon since retina and cochlea develop from the same embryonic layers during the sixth and seventh week of gestation¹⁻³. Many researchers in the past also presented specific links between these sensory modalities and dysfunctions, particularly between deafness and ophthalmologic problems.

The prevalence of ocular abnormalities among deaf children has been reported to vary from 33 to 60%¹⁻⁵. Globally, this ranges between 23% (in Nepal)⁶; 33% (in Perth)⁷, 40.4% (in Turkey)¹, and 48% (in USA)⁸. A prevalence of 22.2% was found in a conventional school population in Western Nigeria⁹. Many researchers have also reported high incidence of ophthalmologic abnormalities among deaf students, compared with hearing population of the

same age (44-45% and 17-30%), respectively². In other related studies, it is established that ocular problems are generally more common in children with hearing problems than in normally hearing children¹⁰. In West Africa, deafness is a common health problem often associated with three major preventable infectious conditions; namely measles, meningitis and rubella¹¹.

Sight is the main sense used to compensate for deafness even though some knowledge is acquired via tactile and olfactory senses¹. Therefore, visual screening is very critical for those with irreversible deafness to facilitate early detection and treatment of ocular problems. These are the best assurances for the maximum possible social and professional adjustments for the deaf². Those with non-correctable and non-treatable visual disorders also require multiple environmental adaptations and appropriate support services². Routine ophthalmologic screening of the deaf (as in this study) is necessary to reduce the deaf-blind population. This study is therefore undertaken to determine the ophthalmologic abnormalities in deaf students in Eastern Nepal with a view to providing appropriate solutions to treatable abnormalities, and to manage those that are not immediately curable.

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METHODS

A descriptive cross-sectional study of 87 deaf students of grade one to senior secondary level of *Birat Bahira Ma Bi* of Eastern Nepal was conducted. All the deaf students attending the special school for deaf were included in the study. Those students who were absent at the time of the study were excluded. Consent was obtained from the students. The teachers also helped in explaining the questionnaire to the students.

The study team consisted of ophthalmologists, optometrists, ophthalmic assistants and eye workers. The students were assessed within the school premises, with their school teachers near them, using a modified screening protocol for visual impairments in children who are Deaf/Hard of Hearing (developed by the Georgia Deaf-Blind Project³ USA). They were examined with a teacher nearby and they responded by sign language, which was interpreted by the teachers, or by sign and oral communication in a few.

The ophthalmic assessment included acuity checks for distance (six metres) and near (33 cm) using the illiterate E-chart, a form of Snellen's line test for distance, and reduced Snellen's illiterate chart for near, respectively. Anterior and posterior segments of the eye were examined.

Those with abnormalities requiring further examination were referred to eye hospital. Colour vision testing (using Ishihara chart) was conducted on all the students. Refraction was done for those with visual impairment that improve with the use of pinhole. Difficult refractions especially in the younger age group were referred to eye hospital for further management. The data collected were analyzed using Microsoft Excel. The mean, standard deviation etc were used as a statistical tool for data analysis.

RESULTS

A total of 87 deaf students were examined. Their age range was six to 25 years with mean age of 15.655 years \pm 3.869 (SD). There were 58 males and 29 females, 66.67 and 33.33%, respectively (M:F= 2:1) [Figure 1].

Hypermetropia was the leading refractive abnormality. Conjunctivitis was also common and predominantly allergic. One child had colour vision deficiency, which was a blue-green color defect. One had optic atrophy. Two others had squint out of which one was divergent

and one was due to hypermetropia (convergent squint). One student (1.14%) had corneal opacities. One was presumed to have Usher's syndrome. No students had the typical salt and pepper fundus of congenital rubella (Table 1).

The interventions included prescription of refractive correction for 13 students, provision of medication for both bacterial and allergic conjunctivitis for four and referral to tertiary ophthalmic care for six (Table 2).

Table 1: Types of ocular abnormalities among the participants (n=87).

Abnormality	Frequency	Percentage
Refractive error	13	14.94%
Conjunctivitis	4	4.59%
Colour vision deficiency	1	1.15%
Squint	2	2.29%
Optic atrophy	1	1.15%
Corneal opacity	1	1.15%
Usher syndrome	1	1.15%
Total	23	26.42%

Table 2: Types of intervention done.

Types of Intervention	Frequency	Percentage
Spectacle Prescription	13	14.94%
Drugs Distribution	4	4.59%
Referral to higher centre	6	6.89%
Total	23	26.42%

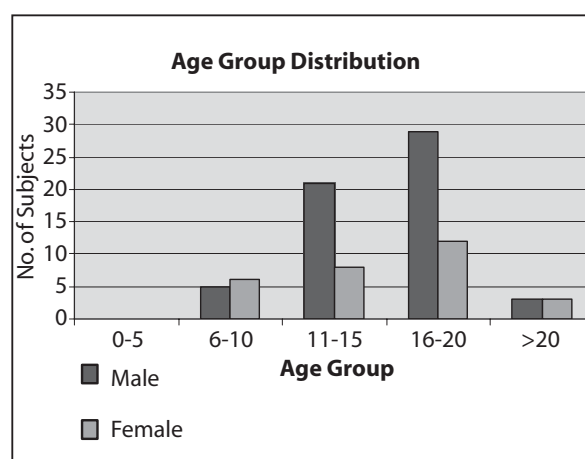


Figure 1: Age and gender distribution of participants

DISCUSSION

The prevalence of ocular abnormalities was relatively low (26.42%) among deaf school students in eastern Nepal compared to previous studies where the prevalence was reported to vary from 33 to 60%¹⁻⁵. The prevalence of ocular abnormalities among deaf children in studies around the globe included the Turkish School for the deaf, 40.4%¹; Deaf School, Kathmandu, Nepal, 23%⁶; Oregon School for the deaf (USA), 48%⁸; and Princess Margaret Children Hospital Perth, 33%⁷. Finding of this study is close to the Kathmandu deaf school study and comparable to what was found in conventional school population of Western Nigeria⁹. Findings in the developed countries show higher prevalence of ocular abnormalities in deaf. The relatively high prevalence in the Western world is most likely attributable to the investigative procedure employed (for example, all the children in the Oregon deaf school study had electroretinogram). This means that even more subtle abnormalities were detected, hence the higher prevalence.

The most common ocular abnormality in this study was refractive error (14.94%). Among these, hypermetropia was the commonest (46.15%) followed by myopia (30.76%) and astigmatism (23.09%) respectively. In a review of 49 patients with sensorineural hearing loss in a tertiary care center of University California, San Francisco, USA, hypermetropia was found to be the most common abnormality¹⁴, similar to the findings of

Table 3: Comparison of ocular morbidities among normal and deaf school children in various studies.

	Types of Abnormality	
	Ocular Morbidities	Refractive Error
Shrestha RK ¹⁸ et al in normal school children	19.56%	11.9%
Nepal BP ¹⁹ et al in normal school children	11%	8.1%
Bista J ²⁰ et al in hearing impaired school children	28%	16.48%
Our study in deaf school children	26.43%	14.94%

this study. However, a conventional school screening in India found myopia to be the commonest, followed by hypermetropia¹³. These eye screenings in both conventional and deaf schools have found refractive error to be a very common cause of ocular morbidity¹⁵, which can be readily managed with spectacle correction. The need for routine school eye screening in both conventional and special schools was thus re-emphasized. Moreso¹⁶ says that the deaf child requires visual compensation for the deafness to prevent a needless deaf-blind¹⁷ situation.

Although rubella retinopathy was the most common retinal finding in previous reports¹⁶, none was detected in this study. This is probably as a result of limited number of students who underwent dilated fundoscopy¹⁷. Other ocular abnormalities found were conjunctivitis (4.59%), optic atrophy (1.15%), squint (2.29%) and corneal opacities (1.15%). Similar findings were found elsewhere¹⁻⁵.

Various studies show that the prevalence of ocular morbidity is more common in hearing impaired children than the normal school children of the same age group¹⁸⁻²⁰. Similarly, the refractive error is more common in the hearing impaired children than the normal school children¹⁸⁻²⁰ (Table 3).

CONCLUSION

Visual abnormalities in deaf students are remarkable in eastern Nepal (26.43%). The situation in a developing country like Nepal continues to challenge the country's socio-economic framework. It calls for an urgent need for improvements in general health services, particularly routine early screening by teachers for the blind who should be trained for continuous screening exercise. This will facilitate early detection of eye/other neurologic diseases. This is to ensure there is no one who is needlessly deaf-blind, and to enhance visual compensation for the hearing loss.

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