

Original Article

# Causes of Blindness and Visual impairment Among Children Studying in Schools for the Blind in Central Development Region of Nepal

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## ABSTRACT

**Introduction:** This study was done to find out the causes of visual impairment in students studying in schools for the blind in the central development region of Nepal.

**Materials and Methods:** The study was done in six schools for the blind in the central development region of Nepal. It was conducted by a team of Eye care professionals using standard eye examination protocols of the World Health Organization Prevention of Blindness Program in the year 2009.

**Results:** A total of 133 students (5 - 21 years age group) enrolled in six schools for the blind were examined. 52.6% of children were visually impaired at birth and 12% developed vision impairment within one year of age. Twenty-one students (15.8%) had mild visual impairment, 5 students (3.8%) had severe visual impairment and 101 students (76%) were blind. The main cause of vision impairment was found to be lens-related anomaly 23.3% and retinal diseases, 18% followed by corneal lesions, 16.5%, and problems with the whole globe, optic nerve, and glaucoma accounting for 12.03%, 11.3%, and 7.5% respectively. The etiology could not be identified in 48.1% followed by hereditary causes (31.6%) and childhood factors (12%). Of the total students examined, 37.6% were visually impaired due to avoidable causes; preventable in 22.6% and treatable in 15% of cases.

**Conclusions:** A high proportion of childhood blindness in schools for the blind in the central development region of Nepal is avoidable.

**Keywords:** Childhood blindness; Low vision; Vision impairment

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## INTRODUCTION

It is estimated that out of the 1.4 million blind children worldwide, one million live in Asia.<sup>1</sup> In the world today, a child goes blind every minute. These children have a lifetime of blindness ahead, with an estimated 75 million blind-years (number blind x length of life), second only to cataracts.<sup>2</sup> The prevalence of blindness ranges from 0.3/1000 children in affluent countries to 1.8/1000 children in very poor communities.<sup>3</sup> The causes of childhood blindness vary worldwide.<sup>4</sup> Many of the causes of childhood

blindness are avoidable, being either preventable or treatable.<sup>5</sup> Early detection and timely management of these disorders can prevent permanent visual loss and prolonged ocular morbidity.

The objectives of the study were to find out the causes of blindness and visual impairment among students studying in schools for the blind in the central developmental region of Nepal, specifically to find out the anatomical site of blindness and visual impairment, to

find out etiology of blindness and visual impairment, to identify avoidable (preventable and treatable) causes of childhood visual loss and to assess the requirement of individual children for optical, medical, surgical or low vision therapy.

## MATERIALS AND METHODS

This was a descriptive, cross-sectional study done for 6 months (January –June 2009) with a purposive sampling technique. Six integrated schools within the central developmental region of Nepal with visually impaired students studying in schools for the blind with a minimum of 10 visually impaired students studying namely Jhuwani Secondary School (SS), Narayani SS, Bharatpur, Laboratory HSS Kathmandu, Namuna Machhindra HSS, Lalitpur, Chandeswori HSS, Tupchhe, Nuwakot, Sanjiwani HSS, Dhulikhel, Kavre, all from Bagmati zone; were selected for study and those students that were absent from the school on the day of examination and not willing to participate in the study were excluded. Detailed information on the schools which enroll blind students in inclusive education in the Central development region of Nepal was obtained from the Education Department, Ministry of Education, Nepal Government. Ethical approval to conduct the study was obtained from the Institutional Review Board of Tribhuvan University Teaching Hospital, Nepal. The WHO/PBL Eye Examination Record for Children with Blindness and Low Vision (ERCB) was used to record the examination findings.<sup>6</sup> Examination was performed and the information was recorded according to the coding instruction and manual for data entry in Epi-info, WHO/PBL examination record for children with blindness and low vision.<sup>7</sup>

Distance vision assessment was carried out with present glass and/or unaided right eye, left eye separately, and then both eyes together with logMAR (Bailey Lovie distance acuity) chart. Objective refraction (Retinoscope, Heine Beta-2000, Germany) was performed then subjective refraction in the right eye, left eye, and both eyes together and recorded. General assessment of hearing loss, mental retardation, physical handicap, and epilepsy was also carried out. Portable slit lamp biomicroscopy was used for anterior segment examination. Posterior segment examination was carried out using both direct (Heine Beta-2000 Germany) and portable indirect ophthalmoscope (Appasamy associates IO wireless) after dilating the pupil wherever indicated. All the collected data were entertained in Epi-info 6.0 and subjected to standard descriptive analysis in frequency, percentage, and ratio.

## RESULTS

A total of 133 students were examined in six schools for the blind in the central development region of Nepal. There were 74 boys (55.60%) and 59 girls (44.4%), giving a ratio of 1.3:1. The age range was 5-21 years. 31.6% of students were above 16 years of age.

In 32 (24%) students, there was a family history of vision impairment due to similar conditions. A total of 32 students had already undergone surgery in one or both eyes in the past. Cataract surgery (21, 66%) was the most frequently performed surgery among these children. Disorders of the lens were found to be the cause of visual loss in 31 children (23.30%), followed by retinal disorder (24, 18.0%), and corneal diseases (22, 16.54%).

whole globe anomaly (16, 12.03%), optic nerve anomaly (15, 11.3%) and glaucoma (10, 7.5%). In children with a lens-related anomaly, untreated cataract was observed in 8 (25%), aphakia in 12 (39%), and pseudophakia in 11 (35%) cases.

Retinal dystrophy was the only retinal disorder responsible for blindness seen in 24 children (18.0%) in this study. Corneal diseases caused vision loss in 22 children (16.54%). The majority of these are attributed to corneal scarring (12.0, 9.0%) following corneal infection and harmful traditional practices. Abnormality in the whole globe was found in 16(55%) children. Of which microphthalmos was responsible for visual loss in 10 (7.52%) children. Aetiology of vision loss could not be identified in 64 students (48.1%) followed by hereditary conditions (42, 31.6%), childhood factor (16, 12.0%), intrauterine (8, 6%) and neonatal factors (3, 2.25%). Fifty (37.6%) students were blind due to avoidable conditions, preventable causes of blindness were seen in 30 (22.6%) and treatable conditions in 20 (15.0%) students.

Among 133 students examined, 70 students (52.63%) had an abnormal vision since birth. Sixteen students acquired vision impairment in the first year of their life and 17 were not able to describe the time of their loss of sight. According to the WHO category of vision impairment, 76% (102) of students were blind and 12% (16) had severe visual impairment on initial examination. Distance vision could be improved in 19 students (14.3%) after refraction. Six students from the mild and severe vision impairment category improved to normal vision, 12 students from the severe visual impairment category improved to mild vision impairment and normal vision category, and one student from the blind category showed one category of vision improvement after refraction. 11 (8.3%) students could read smaller than 2 M print size after low vision assessment for near vision. Vision could not be improved in 101 children (76%) with any therapeutic measures. Improvement in vision was observed in 33 children (24.8%) with spectacles and/or low vision devices and two children were recommended for cataract surgery.

## DISCUSSION

Visual impairment is one of the major public health problems in the world having implications on education, employment, personal, and social aspects of the affected child.<sup>8</sup>

In our study, 88% (118) of children studying in the schools were blind or had severe visual impairment. This proportion of students in schools for the blind with severe visual impairment/blind is far less than reports from India (95.7%),<sup>9</sup> Nigeria (98.6%)<sup>10</sup> and Indonesia (100%).<sup>11</sup> Visually impaired children are not examined by the ophthalmologist/ eye care professionals in Nepal before they are labeled as blind to admit to such schools, which could be the reason for it.

Of 33(24.8%) students who showed improvement with optical devices after refraction, six students (18%) were found to have normal vision and they were needlessly learning Braille. Likewise, 21 (63.6%) had mild vision impairment, the vision which is sufficient enough to recognize letters on the blackboard from the front bench of a classroom. Previous studies conducted in Ethiopia<sup>11</sup> and India<sup>12</sup> also have found uncorrected refractive error to be the major cause of visual impairment. Similar findings were seen in a nationwide survey in schools for the blind in

Nepal.<sup>13</sup>This shows there is a need for the proper refractive correction of visually impaired children during their admission into the school.

The lens-related anomaly (23.3%) was the most frequently observed anatomical site leading to vision loss in our study. This is persistent with the report from Nigeria (23.5%).<sup>14</sup> 25% of children were blind due to untreated cataracts and 64% of students were visually impaired despite undergoing cataract surgery. This shows that children are needlessly blind due to treatable conditions like cataracts which reveals the lack of awareness in the community. At the same time, a higher proportion of children were visually impaired even after undergoing cataract surgery. Delayed presentation, surgical complications, and poor postoperative visual rehabilitation are the reasons for their poor vision. This suggests the need for developing specialist pediatric ophthalmic services for surgical as well as optical management of the condition in eye hospitals of Nepal. Out of 28 cases of cataracts, a cause could not be determined in 12 cases, 8 were hereditary and etiology was presumed to be rubella and toxoplasmosis in 6 and 2 cases respectively.

Retinal dystrophy (24, 18.0%) was the second cause seen in this study. This finding is similar to the Indian study (15.1%) reported by JS Tital.<sup>9</sup> However it is far lower than is reported in the Western world (54.2%).<sup>15</sup> Retinopathy of prematurity (ROP) is the leading cause of blindness in these countries. However, blindness due to ROP was not observed in our study.

Corneal lesions (22, 16.54%) were observed as the third most common cause of blindness, which is mainly attributed to harmful traditional practices and fewer Vitamin A deficiency and measles. The finding is comparable with reports from India (21.7%)<sup>9</sup> but is lower than is reported and West Africa (35.9%).<sup>16</sup> Corneal blindness due to vitamin A deficiency and measles in this study was less as a compared similar study done by Jyoti et al.<sup>13</sup> and to the Nepal blindness survey done more than 3 decades ago which had revealed xerosis, the commonest cause of childhood blindness.<sup>17</sup>

In the whole globe anomaly, microphthalmos (10, 62%) was the most common cause of visual loss. Optic nerve lesion is seen in our study (11.3%) is comparable with reports from India (10.6%).<sup>9</sup> Likewise children blind due to glaucoma (10, 7.5%) is closer to the report from Africa (9.3%).<sup>10</sup>

In the majority of students, the etiology of blindness could not be determined (48.1%), which is comparable with studies from India (46%),<sup>18</sup> Ethiopia (45.1),<sup>19</sup> and China(52.9%).<sup>20</sup> Hereditary conditions responsible for visual loss seen in this study (31.6%) are consistent with the study by SJ Hornby in China (30.7%)<sup>20</sup> and Sri Lanka (35%)<sup>21</sup> but is lower than reported from Indonesian study(42.4%).<sup>10</sup> However the mode of inheritance could not be elicited in more than half of the cases. These findings suggest the need for developing newer advanced diagnostic tools to delineate the unknown etiology. Perinatal factors like cerebral hypoxia and ophthalmia neonatorum (2%) contributed very little to this study, which is similar to the Indian study (1.2%).<sup>9</sup>

In our study, 50 (37.6%) students were blind due to avoidable conditions, preventable causes of blindness were seen in 30 (22.6%), and treatable conditions in 20 (15.0%) students. This finding is similar to the findings in South Africa (38.8%)<sup>22</sup> and India (43.5%).<sup>9</sup> However much higher than is reported in Kenya (28.6%)<sup>23</sup> and much lower than is reported in Uganda (56.7%)<sup>23</sup> and Malawi (67.2%)<sup>23</sup>. Treatable conditions like cataract and glaucoma seen in this study are similar to another South Asian study.<sup>18,23</sup>

The limitation of this study is that it may not give the true picture as the study was carried out in schools of Kathmandu valley and a few cities adjoining it in the central zone. To get the real picture study has to be expanded to students studying in schools in remote areas as well, if possible, it would have been better to include seven zones of Nepal.

## CONCLUSIONS

Nearly 40% of students were found to be blind or visually impaired due to potentially avoidable conditions. Lens, the commonest anatomical site, and congenital cataract is the most common cause, which if intervened timely, blindness could be avoided. In the majority of cases, the actual cause of blindness could not be determined. Vision could be improved in 33 children (24.8%) with optical devices. Statutory eye examination by eye care professionals at the time of admission of these students into the blind section of the school has to be started to avoid children from learning Braille.

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