

## Original research article

**A cross sectional study to assess the prevalence of refractive error and other visual morbidities in school going children****Dr. Bikash Kumar Pandey<sup>1</sup>, Dr. Akanchha Kumari<sup>2</sup>****<sup>1</sup>Senior Resident, Department of Ophthalmology, Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar, India.****<sup>2</sup>Senior Resident, Department of Ophthalmology, AIIMS, Patna, Bihar, India****Corresponding Author: Dr. Akanchha Kumari****Abstract**

**Background:** Childhood visual impairment due to refractive errors is a significant but avoidable problem. Uncorrected refractive errors in school children have a considerable impact on their physical and mental development. So screening school children helps in early detection and timely interventions can improve child's potential tremendously during the formative years.

**Aim:** To determine the Prevalence of refractive error and the eye morbidity in school children in Bihar, India.

**Methods:** A cross sectional study was conducted in the Department of ophthalmology, Jawahar Lal Nehru medical college and Hospital, Bhagalpur, Bihar, India, 15 months. Total 200 children's were included in this study. The colour card and pin holes were also utilized. WHO criteria of visual acuity  $<6/18$  were taken as visually impaired while  $<3/60$  was taken as blindness. A visual acuity of 6/12 does not usually effect school performance and hence are not considered as visually impaired in the current international literature.

**Results:** The result showed that students had a mean age of  $9.7 \pm 2.8$  years, with 54% being female. There was a uniform distribution of students except class II which had 16% students. Only 10% students ever had ophthalmic examination. 58 percent had some form of eye problems, watery eye and infections being the most common. More than 79% used non recommended medicines. The proportion of colour blindness was 2% with a 95% confidence interval between 1.127 and 1.124. The proportion of children with refractive errors was 11% with a 95% confidence interval between 9.01 and 9.11. A significant difference was noted between the type of eye problem and sex ( $p < 0.03$ ), boys had more watery eyes while girls had more infection. There was no significant association of frequency of refractive error with class, ethnic group and other variables in this study.

**Conclusion:** we concluded that the prevalence of refractive error is quite significant. So there is a need to have regular and simple vision testing in school children so that corrective measures may be recommended at the earliest possible.

**Keywords:** Refractive Error, Prevalence, Hypermetropia, Myopia, School Children.

**Introduction**

The child of today is the adult citizen of tomorrow and leader of the community and country as a whole in different spheres of life. It worries us more learning that in the world today a child goes blind every minute. Over 90% of blind children receive no schooling and will be unable to realize their full potential. Thus, blindness in children accounts for one-third of the economic cost of blindness although it represents  $< 4\%$  of the overall magnitude.<sup>1</sup> Childhood blindness is the second largest cause of blind-person years, following cataract. Globally, approximately 70 million blind person years are caused by childhood blindness. There are an estimated 1.4 million blind children worldwide, 73% of whom live in low-income countries.<sup>2</sup>

An additional 7 million suffer from low vision, and another 10 million children have a correctable refractive error causing visual impairment (refractive bilateral visual acuity [VA] of  $< 6/18$ ).<sup>3</sup> India has an estimated 320,000 blind children, more than any other country in the world.<sup>4</sup> Estimated National Prevalence of Childhood Blindness/Low Vision is 0.80/1000 in India.<sup>5</sup> Most of the available studies demonstrate that corneal and lenticular conditions are the predominant causes of blindness, whereas among children outside blind schools, refractive errors are important causes of visual impairment and blindness.<sup>3</sup> In children of age range 5–15 years, the visual impairment is 6.4%, with refractive errors as the major cause.<sup>6</sup> The control of blindness in children is considered a high priority within the “WHO's Vision 2020 - The Right to Sight Programme.”<sup>7</sup> Many conditions associated with blindness lead to childhood mortality; hence, control of blindness in children is closely linked to child survival.<sup>8</sup> Population-based studies have estimated the prevalence of blindness as 1.25/1000 children in rural<sup>9</sup> and 0.53/1000 children in urban areas<sup>10</sup> in the age group of 5–15 years. The available data suggests that there may be a tenfold difference in the prevalence ranging from as low as 0.1/1000 children aged 0–15 years in the wealthiest countries to 1.1/1000 children in the poorest.<sup>11</sup> Considering the fact that 30% of India's blind lose their sight before the age of 20 years, the importance of early detection and treatment of ocular morbidity and visual impairment in young children is obvious.<sup>12</sup> Inadequate infrastructure, funds, political will, national commitment and appropriate research are the barriers to eye care and blindness control. School eye screening is a cost-effective method that plays a vital role to overcome such barriers, and helps in early detection, prevention and treatment of childhood blindness/visual impairment. Nonetheless, the incidence of childhood blindness is very difficult to ascertain, and there is not much reliable data from developing countries. Likewise, not much data is available in the northern region of India, especially in rural sector.

### Material and methods

A cross sectional study was conducted in the Department of Ophthalmology, Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar, India, for 15 months. after taking the approval of the protocol review committee and institutional ethics committee. Total 200 children's were included in this study. A written permission was obtained from school and a verbal consent was obtained from teachers and parents.

The information regarding age, sex, problems of the eye, vision etc. was recorded on a proforma and the Snellens chart was used to measure the visual acuity. The colour card and pin holes were also utilized. WHO criteria of visual acuity  $< 6/18$  were taken as visually impaired while  $< 3/60$  was taken as blindness.<sup>13</sup> <sup>11</sup> A visual acuity of 6/12 does not usually effect school performance and hence are not considered as visually impaired in the current international literature. The criterion of blindness was taken to mark the upper limit for the impaired visual acuity and to separate out visually impaired from blind. All children enrolled from class 1 to class 5 were included in the study. All children below 5 years and any child with congenital eye disease were excluded from study.

#### Methodology

Following variables were selected for the study, beside the socioeconomic and demographic factors; Height and weight of the child, mid arm circumference, number of siblings, number of siblings using glasses, type of eye problem, type of medicine used, (the inquiry was about drops, ointment, any local remedy e.g. honey, surma etc actual drug names were not asked) Visual Acuity, Colour blindness, Correction with pinhole. (We inquired about any problem of eye during last 15 days and if yes, verbal autopsy was done to find out about watery discharge, infection, trauma or any other problem.) A standard examination procedure was used for each study subject.

#### Statistical analysis

All the data obtained was entered into SPSS version 19 and analyzed. Frequency tables were used to describe the data. Mean, median, mode, standard deviation and ranges were determined. The frequency of various eye problems was also determined along with 95% confidence interval Chi square test was used to observe the association of the refractive error with respect to age, sex, education of father, occupation, ethnicity, class, and nutritional status, p-value <0.05 was considered significant..

### Results

The result showed that students had a mean age of  $9.7 \pm 2.8$  years, with 54% being female. In public sectors schools due to late admission and repeated failure one might find overage students in each class. There was a uniform distribution of students except class II which had 16% students. Only 10% students ever had ophthalmic examination. 58 percent had some form of eye problems, watery eye and infections being the most common. More than 79% used non recommended medicines. The proportion of colour blindness was 2% with a 95% confidence interval between 1.127 and 1.124. The proportion of children with refractive errors was 11% with a 95% confidence interval between 9.01 and 9.11 as shown in Table 1.

**Table 1: Distribution of study parameter**

Parameter	Number	Percentage
<b>Age</b>		
5-10 years	126	63
10-15 years	74	37
<b>Gender</b>		
Female	108	54
Male	92	46
<b>Class</b>		
I	36	18
II	32	16
III	44	22
IV	48	24
V	40	20
<b>Students ever examined for eye morbidity</b>		
Yes	20	10
No	180	90
<b>Eye morbidity</b>		
Yes	116	58
No	84	42
<b>Type of eye morbidity</b>		
No problem	84	42
Watering	56	28
Infection	38	19
Trauma	22	11
<b>Type of medicines used</b>		
Recommended	42	21
Non recommended	158	79
<b>Color vision</b>		
Normal	196	98
Color blind	4	2
<b>Visually impaired corrected by pin hole</b>		
Yes	16	8

<b>No</b>	184	92
<b>Refractive error</b>		
<b>Yes</b>	22	11
<b>No</b>	178	89

A significant difference was noted between the type of eye problem and sex ( $p < 0.04$ ), boys had more watery eyes while girls had more infection as shown in Table 2. There was no significant association of frequency of refractive error with class, ethnic group and other variables in this study.

**Table 2: Distribution of type of morbidity by gender**

Type of morbidity	Male	Percentage	Female	Percentage	Total=116	Percentage
Infection	21	37.5	35	62.5	56	48.27
Watery eyes	21	55.26	17	44.74	38	32.76
Trauma and other	15	68.18	7	31.82	22	18.97

### Discussion

In India uncorrected refractive errors are the most common cause of visual impairment and second major cause of avoidable blindness. In the global initiative 2020 for the elimination of avoidable blindness refractive errors have been emphasized together with other ocular diseases like cataract, trachoma and onchocerciasis. The refractive error study in children (RESC) has been formed under this initiative to try and assess the prevalence of refractive errors in children. In the present study, the prevalence of refractive error was 11% with a legal blindness 2%. Criteria for legal blindness was 6/60 as recommended by Kalikivayi et al.<sup>14</sup> Study results are in agreement with the result of Kalikivayi et al, and Nepal BP, et al.<sup>14,15</sup> A lower prevalence has been reported by Dandona et al, Afghani et al, Naidoo et al, Khandekar RB et al, and Garner et al and a high prevalence has been reported by Khan et al, Qayyum S, He M, et al, Goh PP et al, Maule E et al, Hyman L et al, Gordon A and Wingert TA.<sup>16-28</sup> Mean age was in agreement with Kalikivaya et al.<sup>14</sup> In the present study, no association was found between age and the prevalence of refractive error. Our results are in agreement with Murthy while Kalkivayi and Junghans et al, have reported a significant association of refractive error with advancing age among the two groups (5-10years and 10-15years).<sup>29,14,30</sup> In this study, a highly significant association was found between female sex and refractive error. This is similar to other studies by Afghani et al, Awan et al, Khandekar RB et al, Dandona et al<sup>16,18,20,22</sup> However Kalikivayi et al, Junghans et al and Garner et al, did not find any significant association between gender and prevalence of refractive error.<sup>14,21,31</sup> The most important cause of vision impairment in the current study was refractive error, which is comparable with Kalikivayi et al.<sup>14</sup> There was a significant difference in the type of morbidity and gender while Nepal did not find any significant difference<sup>15</sup> This study did not find an association of refractive error with education and occupation of father, which is similar to Murthy et al, while it is in contrast to Dandona et al, who found a significant association between father's education and prevalence of refractive error.<sup>20,29</sup> The prevalence of colour blindness in this study was 2% while Shrestha RK et al, in Kathmando found a prevalence of 2.2%.<sup>32</sup> Regarding ethnicity, no significant association was observed in this study but in WHO studies this variable is taken into account because refractive errors had a strong relation with inheritance.<sup>24</sup> In this study frequency of eye morbidity was 58%, which is similar to Reddy SC, while Shrestha et al and Nepal et al, found a low prevalence.<sup>32,15,30</sup> Infective disorders accounted for 19% of the morbidity in this study which are in agreement with Shrestha et al.<sup>32</sup> It was observed that local and uncertified medicines were used for the local problem e.g. Kajal and Surma etc.

### Conclusion

The present study concluded that the prevalence of refractive error is quite significant. So there is a need to have regular and simple vision testing in school children so that corrective measures may be recommended at the earliest possible.

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