

Refractive Errors among the School-Going Children in Bihar: A Cross-Sectional Study

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Abstract

Aim: The purpose of the present study was to assess the magnitude of refractive errors in the school going children in Bihar region and to study its age and sex distribution, types, distribution and the possible factors associated with them.

Methods: The present study was conducted among the school children in Bihar region for one year. The screening was carried out in 30 schools which included primary, higher secondary, monastic, and private schools. A total of 15,000 children were screened for refractive errors. Permission was taken from the principals of the selected schools. Informed and written consent was obtained from the teachers prior to enrolling the students for the study. Ethical clearance was obtained from the institutional ethics committee.

Results: A total of 15000 school children were screened from 30 different schools of Bihar region. Refractive error was highly prevalent in the age group of 14–17 years with 9.5% (n = 380) among 4000 students followed by 8% (n = 400) in the age group 10–13 years in a total of 5000 children. However, the age group between 6 and 9 years had comparatively less prevalent refractive errors with 3.3% (n = 200) among 6000 students. Regarding gender, out of 7000 males, 6.8% (480) had refractive errors whereas 6.2% (500) females had refractive errors from a total of 8000.

Conclusion: The study provides a useful and baseline data about the refractive error amongst the school children of Bihar region. A larger study needs to be conducted in all the schools of the state to get a clearer picture of RE and other eye related diseases to detect vision problem as early as possible.

Keywords: Refractive error; School children; Spectacles; Myopia; Hypermetropia

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Introduction

Refractive error is an optical defect, intrinsic to the eye which prevents light from being brought to a single point focus on the retina, thus reducing normal vision. Refractive errors affect a large proportion of world's population, regardless of sex, age and ethnic group. [1] We can easily diagnose measure and correct these

refractive errors with spectacles or other refractive corrections to achieve normal vision. If, however, refractive errors are not corrected or the correction is inappropriate, they may become a major cause of visual impairment and even blindness. [2] The estimate of visual disability due to uncorrected refractive

errors is a public health concern. It is reported that more than 12 million children in the age group 5–15 years are visually impaired due to uncorrected or inadequately corrected refractive errors. [3]

Refractive errors can impose a heavy financial burden on the society. [4] School children are considered a high risk group because uncorrected refractive errors can negatively affect their learning abilities and their mental and physical health. [5,6]

Because of the increasing realization of the enormous need for correction of refractive error worldwide, this condition has been considered one of the priorities of the recently launched global initiative for the elimination of avoidable blindness: Vision 2020 - The Right to Sight. [7,8] In India, the overall incidence of refractive errors has been found to vary between 21% and 25% of the patients attending eye outpatient department. [9] Active screening and timely intervention at the right time will not only help in vision restoration but will also influence a child's growth and development. [10,11]

Indications of retinoscopy in children are:

- Gross loss of vision of gradual painless nature.
- Concomitant squint
- Asthenopia, Phoria, Recurrent Stye, Chalazion, Chronic Blepharitis.
- age headache.
- Nystagmus.

Roughly speaking, a gross loss of vision i.e. 6/60 or less that improves with pinhole, is most probably myopia. Children with hypermetropia of same amount have better vision as they can use accommodation to improve their vision. While myopes report for treatment earlier than hypermetropes, Hypermetropia causes more muscle imbalance and asthenopia.

The purpose of the present study was to assess the magnitude of refractive errors in the school going children in Bihar region and to study its age and sex distribution, types, distribution and the possible factors associated with them.

Methods

The present study was conducted among the school children in Bihar region for one year. The screening was carried out in 30 schools which included primary, higher secondary, monastic, and private schools.

Study population

A total of 15,000 children were screened for refractive errors. Permission was taken from the principals of the selected schools. Informed and written consent was obtained from the teachers prior to enrolling the students for the study. Ethical clearance was obtained from the institutional ethics committee.

Eye examination

An eye team consisting of a senior optometrist visited the selected schools. The teachers were selected depending upon the total number of students in the school for the training program organized by the optometrists under the guidance of ophthalmologists. The teachers were sensitized about the magnitude of childhood blindness, their role in the early detection of vision problems, and other eye diseases. They were trained to screen the vision in each eye separately using the Snellen chart in their respective schools and to record questionnaires. An eye health education program was conducted for the students and teachers to make them aware of eye health.

The children detected to have any ocular anomaly by the trained teachers were referred first to an optometrist, who did subjective correction by placing the appropriate lenses in the trial frame.

The visual acuity tested with the Snellen chart placed at 6 m for any children with

refractive errors and for children below 10 years cycloplegic refraction was done using Homatropine 2% eyedrops after 2 h of instilling the drops. Lastly, those who still did not improve were referred to the base hospital for further complete ophthalmic examination by the ophthalmologist.

Refractive errors was diagnosed when the presenting visual acuity was less than 20/40 and improved to >20/40 with correction. Myopia was defined as measured objective refraction of $\geq -0.5D$ spherical equivalent in one or both eyes. Hyperopia was considered when the

measured objective refraction of $\geq +2.0D$ spherical equivalent in one or both eyes was present. Astigmatism was considered when the measured objective refraction of $\geq 0.75 D$ cylinder was there in one or both eyes. These refractive errors were categorized according to the Refractive Error Study in Children (RESC) Survey group. [5]

The data were entered into the Excel sheet and analyzed using the Statistical Package for the Social Sciences version 16.0 (SPSS Inc, Chicago, , IL, USA). The data were expressed as proportions (n, %).

Results

Table 1: Age distribution of refractive error in primary school children

Age group (years)	Total no. of students	Refractive error	%
6-9	6000	200	3.3
10-13	5000	400	8
14-17	4000	380	9.5
Total	15000	980	6.5

A total of 15000 school children were screened from 30 different schools of Bihar region. Refractive error was highly prevalent in the age group of 14–17 years with 9.5% (n = 380) among 4000 students followed by 8% (n = 400) in the age group

10–13 years in a total of 5000 children. However, the age group between 6 and 9 years had comparatively less prevalent refractive errors with 3.3% (n = 200) among 6000 students.

Table 2: Gender distribution of refractive errors in the school

Gender	No. of students examined	Refractive error	Refractive%
Male	7000	480	6.8
Female	8000	500	6.2
Total	15000	980	13

Regarding gender, out of 7000 males, 6.8% (480) had refractive errors whereas 6.2% (500) females had refractive errors from a total of 8000.

Table 3: Refractive error based on myopia, hyperopia, and astigmatism among the school children

No. of students	Myopia (%)	Astigmatism (%)	Hyperopia (%)
980	350 (35.71%)	300 (30.61%)	30 (3.15%)

We also observed that increasing age was associated with an increased risk. From a total of 15000 students studying in different schools of Bihar, the prevalence of refractive errors was 6.5% (n = 980) among which myopia was the most common with 35.71% (n = 350), followed by 30.61% of astigmatism (n = 300), and

the remaining 3.15% (n = 30) with hyperopia.

Discussion

Visual impairment is a worldwide problem that has a significant socioeconomic impact. Childhood blindness is a priority area because of the number of years of blindness that ensues. Data on the

prevalence and causes of blindness and severe visual impairment in children are needed for planning and evaluating preventive and curative services for children, including planning special education and low vision services. The available data suggest that there may be a tenfold difference in prevalence between the wealthiest countries of the world and the poorest, 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. [12] It is estimated that the cumulative number of blind person-years worldwide due to childhood blindness ranks second only after the cumulative number of blind-person-years due to cataract blindness. [13]

We observed that the school children within the age group of 14–17 years were found to be the highest (9.5%) with refractives error and are comparable with many studies indicating that with increasing age, the disease increases. [14-16]

The overall prevalence of refractive errors in the study was 6.5% which is in consort with the study reported by Warad C et al. [17] in Karnataka (6.4%). However, a few studies have reported a higher prevalence and this could be due to multiple factors like population size, geographical locations, and race leading to various disparities. [18] We also observed that the children studying in monastic schools also had refractive errors who are often ignored.

Children do not complain of defective vision, and may not even be aware of their problem. They adjust to the poor eyesight by sitting near the blackboard, holding the books closer to their eyes, squeezing the eyes and even avoiding work requiring visual concentration. This warrants early detection and treatment to prevent permanent disability. Effective methods of vision screening in school children are useful in detecting correctable causes of

decreased vision, especially refractive errors and in minimizing long-term visual disability. [19] Myopia was the most common refractive error (35.71%) followed by astigmatism (30.61%), and hyperopia (3.15%) being the least and many studies have reported similar results. [5,20]

High rate of refractive errors in our study population can also be attributed to different lifestyles or living conditions like watching TV for long hours or using computers. [21]

Conclusion

The study provides useful and baseline data about the refractive errors among the school children of Bihar region. Refractive error was highly prevalent in students belonging to most backward classes, among girls, and in between the age group 14–17 years. Our study also focused on students attending monastic schools which generally remains ignored. A larger study needs to be conducted in all the schools of the state to get a clearer picture of refractive errors and other eye-related diseases to detect vision problems as early as possible.

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