Research Article

Uncorrected refractive error in schoolchildren at Jabalpur district of Madhya Pradesh

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Abstract

Background: Uncorrected refractive error is a public health problem among school-going children. Children with refractive errors exhibit learning disabilities and poor performance. Refractive errors cannot be stopped, but they can be detected by early eye examination and treated with corrective glasses, contact lenses, or refractive surgery.

Objective: To detect the prevalence of uncorrected refractive error in a school at Jabalpur district of Madhya Pradesh.

Materials and Methods: This cross-sectional study was conducted in Varni Digamber Jain Gurukul schoolchildren in the age group of 5–15 years. Children were screened for visual acuity with the help of Snellen's chart. The children who showed refractive problems in preliminary screening were confirmed by ophthalmologist at Department of Ophthalmology, NSCB Medical College, Jabalpur, Madhya Pradesh, India.

Result: A total number of 200 students were screened in the study. In the preliminary screening, a total number of 22 (11%) cases were detected with the problem of refractive error. After confirmation by ophthalmologist through refraction trial, only nine (4.5%) cases were found to show refractory problems. Most of the cases belonged to the age group of 5–8 years. Refractive error was 3.5 times more present in males when compared with female subjects. In four (44.44%) cases, parental history of refractive problems was observed. In this study, 183 (91.5%) children were having both of their eyes normal. Other eye problems were lacrimation and redness in four (2%) cases, followed by squint in two (1%), and Bitot's spot in two (1%).

Conclusion: Uncorrected refractive error is a common public health problem of visual impairment studied in schoolchildren of Jabalpur district. Vision screening is the most appropriate strategy to detect early visual impairment.

KEY WORDS: Uncorrected refractive error, schoolchildren, Snellen's chart

Introduction

An uncorrected refractive error is a public health problem among school-age children. It presents a substantial effect on learning and educational accomplishment, particularly in underserved and poor communities. Refractive error is an optical defect essential to the eye, which inhibits the light from being brought to a single focus on the retina thereupon lowering normal vision.[1] Refractive error is a main provider to visual impairment, which is a major source of morbidity in children globally.[2] Because children do not normally complain of visual problems, early detection and timely treatment of eye disease is significant to avert vision problems and eye morbidities, which could affect their learning ability, personality, and adjustment in school.[3,4]

The overall incidence has been reported to vary between 21% and 25% of the patients attending eye outpatient department in India.[5] About 13% of Indian population is in the age group of 10–15 years.[6] Vision screening is the search for unrecognized eye disease or defect by means of rapidly applied test, examinations, or other procedures in apparently healthy individuals. Three main types are considered as refraction errors: hypermetropia (farsightedness), myopia (nearsightedness), and astigmatism. The existence of myopia is presently attracting worldwide attention as numerous latest studies state

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dramatic rises over the last 20 years.[7,8] Refractive error is one of the most significant cause of visual impairment and second foremost cause of blindness following cataract.[9] Regular eye screening in schools will detect the undiagnosed condition in children. Children with refractive problems in any population simply denote that eye care services are inadequate. The aim of this study was to find the prevalence of the uncorrected refractive error in schoolchildren of Jabalpur district of Madhya Pradesh, India.

Materials and Methods

Study Settings

This cross-sectional study was conducted in Varni Digamber Jain Gurukul School of Jabalpur district, Madhya Pradesh, India, from September 1 to November 31, 2011. The affected, screened subjects were examined at Department of Ophthalmology, NSCB Medical College, Jabalpur, Madhya Pradesh, India.

Ethics Approval and Consent

Research was initiated after acceptance of the study by the Department of Community Medicine, NSCB Medical College, Jabalpur, and permission from the principal of the school. Informed consent was taken from participants. During processing of the data, confidentiality was maintained.

Methods

This was institutional-based, cross-sectional study. Study population constituted schoolchildren in the age group of 5–15 years. The study subjects were selected by consequential purposive sampling technique. By this technique, all the 200 students in the age group of 5–15 years were included in the study to find out the prevalence of uncorrected refractive error. All the students were screened with the help of Snellen's chart. Visual acuity (VA) was measured at a distance of 6 m. Children had their VA taken while wearing their glasses. All those suspected cases with VA of less than 6/12 in one or both eyes were tested for the presence of refractive error through refraction trial by the ophthalmologist at NSCB Medical College, Jabalpur, for the confirmation. If it is corrected through refractory trials, then it is diagnosed as refractory error. Binocularity was investigated using cover test. Ocular health examination, including internal and external, using the monocular direct ophthalmoscope and focal illumination were done in affected children. The educational intervention was given to all students for prevention of eye problems and refractive error. Confirmed cases were followed up for their visits to Department of Ophthalmology and wearing of glasses. Data were analyzed with the help of Microsoft Office Excel 2007.

Result

A total number of 200 students were screened and examined for refractive error. The maximum number of children [87 (43.5%)] belonged to 13–15 years age group, followed by 66 (33%) of 9–12 years, and only 47 (23.5%) belonged to 5–8 years [Table 1].

Table 1: Distribution of the students according to the age group

Age group (years)	No.	%
5–8	47	23.5
9–12	66	33.0
13–15	87	43.5
Total	200	100

Table 2: Gender-wise distribution of children screened

Gender	No.	%
Male	108	54
Female	92	46
Total	200	100

The male subjects were 108 representing 54%, while female subjects were 92 representing 46% of the screened subjects. The male to female ratio (M/F) was 1.17 [Table 2].

In the preliminary screening, a total number of 22 (11%) cases were detected with the refractive error. After screening, most of the cases detected [eight (17.02%)] belonged to 5–8 years age group, followed by nine (13.63%) in 9–12 years, and only five (5.74%) belonged to 13–15 years age group [Table 3].

In the confirmation by ophthalmologist by refraction trial, only nine (40.90%) of 22 children in the preliminary screening presented the problem of refractive error. The refractory error was present mostly in the age group of 5–8 years. Of nine children, myopia in four (44.44%) children, hypermetropia in three (33.33%) children, and astigmatism in two (22.22%) children were found [Table 4].

The refractive error was 3.5 times present in male subjects when compared with female subjects after confirmatory test by ophthalmologist [Table 5].

In this study, no family history of problem of refractory error was seen in five (55.56%) of the affected children. In three (33.33%) children, either parents showed the problem of refractory error, but only one (11.11%) of the affected children had both parents with refractory issue [Table 6].

In this study, 183 (91.5%) of the subjects revealed both of their eyes normal. Refractory error was found to be present in nine (4.5%) cases, followed by lacrimation and redness in four (2%), squint in two (1%), and Bitot's spot in two (1%) [Table 7].

Percentage of children with refractory problems = No. of children diagnosed with refractive error/No. of children screened for refractive error × 100 = 9/200 × 100 = 4.5%.

Discussion

This cross-sectional study was conducted in Varni Digamber Jain Gurukul School in Jabalpur district of Madhya Pradesh, India. Children were screened for VA with the help of Snellen's

Table 3: Age-wise distribution of children detected after preliminary screening for refractory error

Age group (years)	Total children	No. of children detected after preliminary screening	Percentage of detection after screening
5–8	47	8	17.02
9–12	66	9	13.63
13–15	87	5	5.74
Total	200	22	11

Table 4: Age-wise distribution of children detected after confirmation by ophthalmologist for refractory error

Age group (years)	No. of children detected after preliminary screening	No. of children detected after confirmatory test	Percentage of children detected after confirmatory test
5–8	8	4	50
9–12	9	2	22.22
13–15	5	3	60
Total	22	9	40.90

Table 5: Gender-wise distribution of children detected after confirmation by ophthalmologist for refractory error

Gender	No. of children detected after preliminary screening	No. of children detected after confirmatory test	Percentage of children detected after confirmatory test
Male	17	7	41.17
Female	5	2	40
Total	22	9	40.90

Table 6: Distribution of children according to the family history of refractory error

Family history of refractory error	No.	%
No family history in parent	5	55.56
Either parent having refractory error	3	33.33
With both parents having refractory error	1	11.11
Total	9	100

Table 7: Distribution of subjects according to various ophthalmic problems

Ophthalmic problem	No.	%
Refractory error	9	4.5
Squint	2	1.0
Bitot's spot	2	1
Lacrimation and redness	4	2
Normal eyes	183	91.5
Total	200	100

chart. The children who were diagnosed with refractory problem in initial screening were confirmed by the ophthalmologist. The visual experience of a child occupies an important part in a person's mental, physical, and intellectual developments.[10] Visual impairment owing to refractive error is an important reason of illness in children worldwide.[11,12] With increasing emphasis on eliminating avoidable blindness,[13] refractive error correction has assumed a place of prominence in the blindness prevention efforts of any nation.

A total number of 200 students were screened and examined for refractive error. The maximum number of patients [87 (43.5%)] belonged to 13–15 years age group. The male to female ratio (M/F) was 1.17.

In the preliminary screening, a total of 22 (11%) cases were detected with the refractive error with the help of Snellen's chart. Most of the cases belonged to the age group of 5–8 years. After examination of affected children through refractory trial and ophthalmologic examination, it was only nine (4.5%) children who were affected with the problem of refractory error. Rest of the children were treated according to their ophthalmologic problems. The prevalence of refractive error in this study falls within the WHO prevalence of 2%–10% worldwide.[14] Moreover, the prevalence in this study was close to that observed by Chuka-Okosa[15] in her study on refractive error in rural schoolchildren in Nkanu West LGA of Enugu State, southeastern Nigeria, where she reported a prevalence of 1.97%. The case definition for refractive error was, however, different in the study by Chuka-Okosa as only pupils with VA of less than 6/9 were further investigated for refractive error. On the other hand, Ajaiyeoba et al.[16] in his study on blindness and visual impairment among schoolchildren in a rural community in southwestern Nigeria, observed a lower refractive error prevalence of 0.87%.

Most of the cases of refractive error belonged to the age of 5–8 years, followed by 9–12 years, and then 1315 years. Kawuma and Mayeku[17] in Uganda found the prevalence of refractive errors in primary schoolchildren to be 11.6%.

The high prevalence in the study may be partly owing to the relatively small study population of 623 pupils. The study by Kawuma and Mayeku contrasted with a similar study by Wedner et al.[18] in rural Tanzania, which showed a low prevalence of 1% for refractive error in schoolchildren aged 7–19 years. The lower prevalence in the study by Wedner et al.[18] study is likely to be owing to the reason that only the proportion of pupils with a VA of less than 6/12 were considered in the study.

In our study, it was shown that refractive error is 3.5 times more common in boys when compared with girls. However, in other studies,[19,20] refractive errors were found to be more common in girls than in boys. In these studies, the differences were related to the possible differences in the rate of growth between girls and boys. Girls attain puberty earlier on an average and reach their final body weight 1–2 years earlier than boys.

In this study, no family history of problem of refractory error was found in 55.56% of affected children. In three (33.33%) cases, either parent showed the problem of refractory error, but only one (11.11%) case had both parents with the problem of refractory issue. In other studies,[21,22] the risk of myopia increased with the number of parents with myopia.

In this study, 91.5% of children were having both their eyes normal. Refractory error was found to be present in only nine (4.5%) cases, followed by lacrimation and redness in four (2%), squint in two (1%), and Bitot's spot in two (1%). In other studies, higher (3%–17.5%) prevalence of conjunctivitis has been reported in other parts of India.[23] In a study, prevalence of squint as reported by Pratap *et al.*, of 2.8% of primary squint and that of paralytic squint as 0.42%, is similar to our study. Vitamin A deficiency up to an extent of 5.4%–9% in 4–16 years has been reported from Rajasthan and Kolkata, respectively when compared with 1.0% in this study.[24,25]

Conclusion

Uncorrected refractive error is a common public health problem of visual impairment studied in schoolchildren of Jabalpur district. Appropriate refractive care services in school can significantly reduce the visual impairment in school-going children.

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