Section: Ophthalmology

Original Research Article

A HOSPITAL BASED CROSS SECTIONAL STUDY ON PATTERN OF REFRACTIVE ERRORS AND COMPLIANCE TO SPECTACLE USE IN RURAL SCHOOL CHILDREN AT TERTIARY CARE CENTRE

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Received *: 13/10/2025*
Received in revised form *: 04/11/2025*
Accepted *: 25/11/2025*

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DOI: 10.70034/ijmedph.2025.4.387

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (4); 2162-2165

ABSTRACT

Background: Refractive errors (RE) are the most common cause of avoidable visual impairment in children. But benefits of visual aids, which are means for correcting RE, depend on the compliance of visual aids by end users. Our study aimed to find the compliance of spectacle wear among secondary school children in rural areas of Sikar district in Rajasthan.

Materials and Methods: The present study is a descriptive cross-sectional study done on all primary school children who attended Eye Outpatient Department of SK Government Medical College, Sikar, Rajasthan, India during one-year period and those children who were screened during school eye screening camps in school premises itself, were included in this study under school screening program. The students were examined by a team of optometrists who collected the demographic details, observed if the child was wearing the spectacles, and performed an ocular examination.

Results: The prevalence of refractive error in this study is 11.4%. There is no significant difference in prevalence of refractive error between two sexes. The prevalence increases with age. The common refractive error was astigmatism followed by myopia and then hypermetropia.

Conclusion: Refractive error is important cause of treatable blindness in school going children in the age group of 5-16 years. Hence, regular eye screening among schoolchildren is mandatory as is covered under NPCB.

Keywords: Refractive errors (RE), Visual acuity (VA), Best-corrected visual acuity (BCVA), spectacle compliance.

INTRODUCTION

India has one of the largest populations of school children in the world. Visual impairment in children is mostly detected during school screening program in accordance with National Programme for Control of Blindness. Uncorrected refractive errors constitute a large number of children with treatable blindness.[1] Uncorrected refractive error (URE) is the leading cause of vision impairment and the second leading cause of blindness globally[2], affecting 1 in 90 people of all ages.[3]

Correction of refractive error brings forth many desirable outcomes in children, such as better academic performance, better participation in activities, overall personality development and self-confidence, and becoming a better individual as a youth. Hence, addressing refractive errors in children is, in fact, an 'investment in the country's better future.' The government has included refractive error check-ups under the school health program and the provision of free-of-cost spectacles to all children who are found to have refractive errors. Whether free spectacle distribution is the solution to this problem. The non-compliance rate is found to be as high as 65–70% in different studies carried out across the country.[4-6] Most of the time, energy and effort spent on school screening activities go to waste. While refractive errors are less common amongst rural than urban children, rural children have lesser access to

refractive services.[3,7] Our study aimed to find the compliance of spectacle wear among secondary school children in rural areas of Sikar district in Rajasthan.

MATERIALS AND METHODS

The present study is a descriptive cross-sectional study done on all primary school children who attended Eye Outpatient Department of SK Government Medical College, Sikar, Rajasthan, India during one-year period and those children who were screened during school eye screening camps in school premises itself, were included in this study under school screening program. Detailed history was taken from all the students including family history, current problems, past problems, and treatment taken. The students then underwent a preliminary ocular examination. Snellen's chart was used at 6 m distance for assessment of uncorrected, presenting, and best corrected visual acuity (VA). Extraocular movements and cover test were performed using torch light, and convergence was tested using royal air force rule. Children with defective vision were selected for detailed ocular examination including VA both for distance and near, objective refraction with autorefractometer followed by streak retinoscopy under 1% cyclopentolate eye drops, anterior segment, and fundus examination. Children with prior ocular surgery were excluded from the study.

Statistical Analysis: Chi-square test was used to analyse differences in the refractive errors between males and females and among different age groups. $P < 0.05$ was considered significant.

RESULTS

A total of 500 children between 5 and 16 years of age were included in the study. 265 (53%) out of these were male students and 235 (47%) were female students giving a male: female ratio of 1.12.

Unaided VA was normal (6/6) in 440 (88%) students. Presenting VA was normal (6/6) in 455 (91%) students. Presenting VA 6/9-6/12 was found in 33 (6.6%) students and 6/18-6/60 was observed in 8 (1.6%) students. VA <6/60 was seen in 10 (2%) students (table 1). After refractive correction, VA improved to 6/6 in 495 (99%) students. 3 (0.6%) students whose best-corrected VA was <6/12 were amblyopic. [Table 1]

A total of 57 children (11.4%) had refractive error. Refractive error was prevalent in 32 (12.08%) males and 25 (10.64%) females. There was no significant difference between the prevalence of refractive error between male and female sex ($P > 0.05$) (table 2).

The prevalence of refractive error which was 3.33% in 5-7 years age group increased to 17.33% in 14-16 years age group. This increase was statistically significant ($P < 0.01$). [Table 2]

The prevalence of myopia increased from 9.52% in 5-7 years age group to 42.85% in 14-16 years age group. The prevalence of hypermetropia progressively decreased from 50% in 5-7 years age group. The prevalence of astigmatism progressively decreased from 34.37% in 5-7 years age group to 15.62% in 14-16 years age group. [Table 3]

Table 1: Distribution of uncorrected, presenting, and best corrected VA

VA	Unaided n (%)	Presenting n (%)	BCVA n (%)
6/6	440 (88%)	455 (91%)	495 (99%)
6/9-6/12	35 (7%)	33 (6.6%)	3 (0.6%)
6/18-6/60	15 (3%)	8 (1.6%)	2 (0.4%)
<6/60	10 (2%)	4 (0.8%)	0 (0%)

Table 2: Prevalence of refractive error by age and sex

Demographic variables	Refractive error absent	Refractive error present
AGE (YEARS)		
5-7 Yrs (N=60)	58 (96.66%)	2 (3.33%)
8-10 (N=130)	121 (93.07%)	9 (6.92)
11-13 (N=160)	140 (87.5%)	20 (12.5%)
14-16 (N=150)	124 (82.66%)	26 (17.33%)
GENDER		
Males (N=265)	233 (87.92%)	32 (12.08%)
Females (N=235)	210 (89.36%)	25 (10.64%)

Table 3: Association of age with the type of refractive error

Age (years)	Myopia n=21 (%)	Hypermetropia n=4 (%)	Astigmatism n=32 (%)	P
7-May	2 (9.52%)	2 (50%)	11 (34.37%)	<0.05*
10-Aug	4 (19.04)	1 (25%)	9 (28.12%)	
13-Nov	6 (28.57%)	1 (25%)	7 (21.87%)	
14-16	9 (42.85%)	0 (0%)	5 (15.62%)	

DISCUSSION

Refractive errors are the most common cause of preventable blindness in school-going children in India.[3] The problem can easily be treated with spectacles, which is a quick and inexpensive option for treating refractive error. However, refractive errors go undetected in many children. School screening and spectacle distribution is a very good initiative taken by the government of India as recommended by the WHO. For that, the government of India is running school screening programs. However, in a country like India, with a huge population, the resources are limited. In previous reports, it has been emphasised multiple times that the coverage of school screening is not 100%,[5] and out of those screened, not all students receive spectacles even though prescribed.

In India as in other developing countries, the school health services provided are quite insufficient contrary to services provided in developed countries. India being a developing country, there is shortage of infrastructure and resources.

Among various eye disorders in schoolchildren, prevalence of refractive error in this study was 11.4% which was slightly lesser to prevalence observed by Shakeel et al. in Dehradun (13%)[8] and Sharma et al,[9] in Haryana (13.65%). However, due to differences in demographic factors, socioeconomic factors, different race, etc., prevalence in this study is higher when compared to that by Murthy et al,[7] in New Delhi (6.4%) and Kumar et al,[10] in Lucknow (7.4%). Variations in prevalence data were observed from different parts of the world also like 8.2% in Baltimore, the USA,[11] 12.8% in Shunyi district in China,[12] 2.9% in Nepal,[13] and 15.8% in Chile.[14]

There was no significant difference in the prevalence of refractive error between males and females in our study ($P > 0.05$). This was similar to the results shown by Ande et al. in Andhra Pradesh,[15] and Krisnan et al. in Villupuram and Puducherry,[16] where no sex predilection of refractive error was seen. However, some studies showed evidence of increased prevalence in female students,[5,17] which can be due to earlier puberty in girls with respect to boys. This was in contrast to Sriram and Raj,[18] in Tamil Nadu which showed refractive errors to be more prevalent in male children (21.5%) than female children (17%).

In the present study, myopia showed an increasing trend with advancing age whereas hypermetropia and astigmatism showed a decreasing trend with advancing age which was statistically significant ($P < 0.05$). Similar pattern was shown in many previous studies conducted in Dehradun,[8] New Delhi,[7] Andhra Pradesh,[15] and Kolkata.[18] There was no significant difference in the prevalence of myopia, hypermetropia, and astigmatism between males and females in our study ($P > 0.05$). Similar results were shown in a study conducted in Villupuram and Puducherry.[16] In a study conducted by Pune,[19] myopia was found to be more prevalent in females (57.35%) as compared to males (42.65%). Hypermetropia was equally prevalent in both sexes (50%), astigmatism was found only in females (100%) and myopia was shown to be associated with female gender (65%) in a study conducted in Kolkata.[18] Myopia was shown to have no sex predilection in few other studies.[17,20] Study conducted by Shakeel et al[8], has also shown that myopia has increasing trend with age whereas hypermetropia and astigmatism have decreasing trend with age.

CONCLUSION

Refractive error is a common cause of visual impairment among schoolchildren in developing countries. Uncorrected refractive errors can cause immediate and long-term consequences in children and adults such as lost educational and employment opportunities, reduced economic gain for individuals, families, and societies with impaired quality of life.

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