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Prevalence of Refractive Errors in a Population of Schoolchildren: An Epidemiologic Study

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ABSTRACT

Introduction: Refractive error is the leading cause of visual impairment around the world and second leading cause of treatable blindness. To determine etiology of refractive errors, strongest evidence is provided by population based studies using larger sample population. Present study was aimed to study and evaluate the prevalence of refractive errors in the school children and to evaluate socio-demographic factors bearing on refractive errors. **Materials and Methods:** 1500 students of different schools of Kapurthala, Punjab (INDIA) were screened for present study. Random cluster sampling procedure was used to identify the study population. **Observations:** Among the 1500 school children screened, 187 had refractive errors accounting to 12.47% in study population. Out of 187 children who were found to be having refractive error; 21 students (11.23%) were already using spectacles at the time of screening, 65(34.76%) students had symptoms and 101 (54.01%) didn't have any symptoms. Most common refractive error found was myopia (4.87% prevalence in study population). **Conclusion:** Present study documents significant visual disability due to refractive error in this Indian population, a result with potential significance for vision program planners because of the large number of children affected. Data suggests that screening for refractive errors might begin at an earlier age when the prevalence of these appears to increase markedly.

KEYWORDS: Refractive error, Myopia, Children.

INTRODUCTION

Refractive error is the leading cause of visual impairment around the world and second leading cause of treatable blindness.[1] As well as uncorrected refractive error is the leading cause of visual disability among school-aged children in the worldwide.

The prevalence of refractive errors in the general population of our country has been estimated to be 14.2%, 7.35% of bilateral blindness and 18.87% low vision are due Refractive error in India. 46.69% of all ocular morbidity in the country is directly attributable to refractive errors.[2] Uncorrected refractive error impairs vision-related quality of life and substantial difficulty in performing vision-related tasks.[3]

To determine etiology of refractive errors, strongest evidence is provided by population based studies using larger sample population.

Using identical methodology and protocols, population based refractive error surveys in children were recently conducted in China, Malaysia, South Africa, Nepal, India and Chile.[4-11] These surveys were conducted to assess the age and sex-wise prevalence of refractive error and related visual impairment in children of different ethnicities and cultural environment, using consistent definitions and methods.[12] Thereby providing directly comparable data from entirely different parts of the world.

A high frequency of myopia was observed in China and Malaysia,[4-6] lower prevalence of myopia was found in Chile, India, Nepal and South Africa[7-11]. A higher frequency of hyperopia was observed in Chile and urban areas of India[7,10] while lower prevalence of hyperopia was found in China, Malaysia, Nepal, South Africa and rural areas of India.[4-6,8,9,11] But, These data are inadequate for planning cost-effective interventions—particularly in India, because of potentially significant biases brought about by under enrollment of children from lower socioeconomic strata.[13] Therefore, present study was aimed to study and evaluate the prevalence of refractive errors in the school children and to evaluate socio-demographic factors bearing on refractive errors.

MATERIALS AND METHODS

1500 students of different schools of Kapurthala, Punjab (INDIA) were screened for present study. Random cluster sampling procedure was used to identify the study population.

Sampling technique and method of collection of data were used according to standard protocols as used in previous studies. After taking consent of government education authorities, schools where study to be conducted were selected by random cluster sampling.

All primary and high schools in of the city were listed and numbers were given to each school. Chits bearing the school number were rolled and put in to a box, 5 chits were drawn like lucky draw method.

Study was conducted from July 2014 to June 2015. Child having visual impairment due to corneal opacities, Lens opacities, Retinal diseases and Optic nerve disease, previous eye surgery etc. were excluded.

Method of collection of the data: The purpose and method of examination of the students were explained to the Head of the schools concerned. After obtaining socio-demographic details, with the help of concerned class teachers all the students in the school between 7 to 15 years were subjected to visual acuity tests one by one. First, the right eye was tested and then the left eye, both without (uncorrected visual acuity) and with (presenting visual acuity) spectacles, if the child brought them.

The students whose visual acuity was observed to be 6/6 (p) or less were again subjected to visual acuity test.

The list of the students was given to the class teacher and school head. Their parents were informed by the school authority to take the students to the outpatient department of ophthalmology SGL charitable hospital, Mustafabad, Kapurthala, Punjab (INDIA) on a particular day for further evaluation under slit lamp, retinoscopy, and fundus examination etc.

This being a Cross-sectional cum therapeutic programme prescription was given and the condition and prognosis were discussed with the parents and were advised to get the refraction tested regularly.

OBSERVATIONS

Among the 1500 school children screened, 187 had refractive errors accounting to 12.47% in study population. Demographic profile of the sample population is shown in Table 1 & 2 and refractive errors in study population according to socio economic status are presented in table 3. Modified BG Prasad's classification was followed to categorize socio economic status.

Out of 187 children who were found to be having refractive error; 21 students (11.23%) were already using spectacles at the time of screening, 65(34.76%) students had symptoms and 101 (54.01%) didn't have any symptoms. Results are tabulated in table 1-4.

Most common refractive error found was myopia (4.87% prevalence in study population).

Table 1: Demographic profile of study population.

Gender	Number	%	Number	%
	Total sample		Refractive error found	
Male	962	64.13	103	55.08
Female	538	35.87	84	44.92
Total	1500	--	187	12.47

Table 2: Age wise distribution of study population.

Age in years	Number	%	Number	%
	Total sample		Refractive error found	
7-9	487	32.47	49	26.2
10-12	501	33.4	65	34.76
13-15	512	34.13	73	39.04
Total	1500	--	187	12.47

Table 3: Socio-demographic profile of study population.
(Based on Modified BG Prasad's classification)

Socio-economic status	Number	%	Number	%
	Total sample		Refractive error found	
I- Upper Class	2	.13	0	0
II-High	7	0.47	1	0.53
III-Upper middle	381	25.4	67	35.83
IV-Lower middle	609	40.6	76	40.64
V-Poor	495	33	42	22.46
VI-Very poor	6	0.4	1	0.53
Total	1500	100	187	12.47

Table 4: Refractive error in study population.

Type of error	Affected	Prevalence	%
Myopia	73	4.87	39.04
Hypermetropia	51	3.4	27.27
Astigmatism	63	4.2	33.69
Total	187	12.47	100.00

DISCUSSION

An unaided visual acuity of 6/6 (p) or worse was present in one or both eyes due to refractive errors in 187 children. The prevalence of myopia in the study was 4.87% which can be compared to study conducted by Puttanna[14], Sandeep K et al.[15]. Substantially higher prevalence was reported 6.8% in Chile[7], 16.2% in China[4], while, lower prevalence was seen 1.2% in Nepal[8] or the 4.1% in rural India[9].

The prevalence of hyperopia 3.4% was comparable to china[4]-3.5% while substantially higher prevalence was seen in chile[7]-16.3% as well as lower figures were reported in rural Nepal[8]-1.4% and the 0.8% in rural India.[9]

The 4.2% prevalence of astigmatism was more than the 2.2% and 2.8% found in Nepal[8] and rural India[9], but substantially less than the 15% in China[4] or the 19% in Chile.[7]

Fathers with higher levels of education were more likely to have children with myopia—a finding that was also true in rural India[9], even though there were relatively few families of high educational status. Educational attainment of the father is a surrogate indicator of family socioeconomic status and the emphasis usually given to the children's schooling, the association of the father's education with myopia in children is consistent with the hypothesis that myopia is fostered by reading and other close work.[16,17] Lower rates of myopia prevalence were found in both rural Nepal and rural India—underdeveloped regions where less emphasis is led on schooling and children withdraw from school at an early age frequently—which is also consistent with the schooling-intensity hypothesis.

Geographic and ethnic differences in the prevalence of childhood refractive error are well recognized globally, their meaningful comparisons are problematic due to several reasons like different or inadequately described studies and examination methods, non-uniform definitions for hypermetropia and myopia, and differences underlying the age and gender mix of the populations studied.[18] The magnitude of the difference between baseline and best corrected visual acuity indicates that more than an 80% reduction in bilateral vision impairment could be realized if all children were provided with appropriate spectacles.[10] An unmet need for spectacles was also found in rural India[9] , China[4] and Chile[7].

Present study also concludes that such a large percentage of children with vision-reducing refractive error are apparently not wearing eyeglasses, population-based screening programs may be necessary to reduce visual impairment among school-aged children. Substantial benefit to society could be provided by the provision of refraction services and the availability of affordable spectacles. Although current practice in the school eye screening program in India is to begin screening at 12-14 years of age, data suggests that screening for refractive errors might begin at an earlier age screening for refractive errors might begin at an earlier age when the prevalence of these appears to increase markedly.

CONCLUSION

Present study documents significant visual disability due to refractive error in this Indian population, a result with potential significance for vision program planners because of the large number of children affected. Such a large percentage of children with vision-reducing refractive error are apparently not wearing eyeglasses, population-based screening programs may be necessary to reduce visual impairment among school-aged children. Data suggests that screening for refractive errors might begin at an earlier age when the prevalence of these appears to increase markedly.

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