

Magnitude of Refractive Errors among school children in a rural block of Haryana

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Abstract

Objectives: To study the prevalence of Refractive Errors in school children (6-15 years) and their association with age and sex. **Study Design:** Cross-sectional. **Setting:** Govt. Senior Secondary Schools of Block Lakhanmajra. **Participants:** 1265 school children (6-15 years). **Methodology:** Out of 16 Govt. Senior Secondary Schools, 4 were randomly chosen. Students aged 6-15 years studying in class 1 to 10 were included in the study. Visual Acuity (VA) test was performed using Snellen's E chart. The finding of clinical examination was recorded on a pretested Performa and were analysed. **Statistical Analysis:** percentages, Chi-square test and Fisher's exact test. **Result:** Out of 1265, 172 children (13.6 %) were found to have defective vision ($\leq 6/9$). Myopia affected only one eye in 22(1.74%) students while both eyes were affected in 131(10.36%) students. Hyperopia affected one eye only in 2(0.16%) students while in 17(1.34%) students both eyes were affected. The prevalence of myopia, hyperopia & astigmatism was more in girls (23.7%) as compared to boys (12.2%). The prevalence of myopia & astigmatism was more in higher age groups and the prevalence of hyperopia was more in lower age groups. **Conclusion:** Refractive errors can have a long term impact on the learning abilities of school children and visual screening by trained teachers can play an important role in early detection and prevention of further complications.

INTRODUCTION

Refractive error is an optical defect intrinsic to the eye which prevents the light from being brought to a single point focus on the retina thus reducing normal vision ₁. Refractive errors are common in children and are easily correctable, usually with the use of the spectacles. These are the commonest cause of visual impairment around the world and the second leading cause of treatable blindness ₂. Refractive errors may appear throughout childhood and adolescence. If refractive errors are left untreated they can result in amblyopia and or strabismus ₃.

Objectives- To study the prevalence of Refractive Errors in school children (6-15 years) and their association with age and sex.

MATERIAL AND METHODS

The present cross-sectional study was carried out from September 2006 to July 2007 in block Lakhanmajra, which is the field practice area attached to the department of Community Medicine, Pt. B.D. Sharma Post Graduate

Institute of Medical Sciences, Rohtak. The study subjects were school going children in the age group of 6-15 years. Out of total 16 Govt. schools existing in the block, two girls' schools and two boys' schools were randomly selected and all the students between 6-15 years of age, studying in class 1st to 10th were included in the study. The students were divided in to three age groups: 6-10 years, 10-13 years and 13-15 years. All concerned Principals, teachers and students were briefed about the study. The students present on day of visit were included in the study. No follow up visits were done. The age of students was ascertained as per the school records. Visual Acuity (VA) test was performed using Snellen's E chart. If distant visual acuity was $< 6/6$, then those students were subjected to refraction by ophthalmic assistant. VA $< 6/6$ was taken as criteria of defective vision because criterion of low vision according to WHO (VA $\leq 6/18$ in better eye) is already grossly subnormal for school children.

Information was collected on a pretested semi structured schedule. After collection, the whole data was compiled; analyzed and appropriate statistical tests like simple

proportions, chi-square (χ^2) test and Fisher's exact test were applied.

RESULTS

Out of total 1265 students, Myopia affected only one eye in 22(1.74%) students while both eyes were affected in 131(10.36%) students. Hyperopia affected one eye only in 2(0.16%) students while in 17(1.34%) students both eyes were affected. The prevalence of myopia, hyperopia & astigmatism was more in girls as compared to boys. Myopia and astigmatism were found to be highly significantly associated with girls in both cases either better eye or worse eye. The association of hyperopia was not found to be significant. Table I shows sex wise distribution of refractive errors.

Figure 1

Table 1: Sex wise distribution of refractive errors

Refractive Errors	Worse Eye					Better Eye				
	Sex		Total n=1265 [%]	χ^2 Value (df-2)	P Value	Sex		Total n=1265 [%]	χ^2 Value (df-2)	P Value
	Boys n=510 [%]	Girls n=755 [%]				Boys n=510 [%]	Girls n=755 [%]			
Myopia	39 [7.7]	114 [15.1]	153 [12.1]	16.37	<0.000*	31 [6.1]	100 [13.5]	131 [10.4]	17.14	<0.000*
Hyperopia	7 [1.4]	12 [1.6]	19 [1.5]	0.09	>0.50	5 [0.98]	12 [1.6]	17 [1.3]	2.24	>0.10
Astigmatism	16 [3.1]	53 [7.0]	69 [5.46]	9.15	<0.01*	14 [2.8]	51 [6.8]	65 [5.1]	18.92	<0.000*
Total	62 [12.2]	179 [23.7]	241 [19.1]			50 [9.83]	163 [21.6]	213 [16.8]		

Both the tables' (Table II &III) show that the prevalence of myopia & astigmatism was more in higher age groups and the prevalence of hyperopia was more in lower age groups. Myopia and astigmatism in both the cases were strongly associated with increase in age . The association of hyperopia was not found to be significant in both the cases.

Figure 2

Table 2: Age wise distribution of refractive errors according to worse eye

Refractive Errors	Age Groups (years)			Total n=1265 [%]	χ^2 Value (df-4)	P Value
	(6-10) n=282 [%]	(10-13) n=536 [%]	(13-15) n=447 [%]			
Myopia	9 [3.2]	48 [8.9]	96 [21.5]	153 [12.7]	66.05	<0.00*
Hyperopia	5 [1.8]	8 [1.5]	6 [1.3]	19 [1.5]	0.115	>0.50
Astigmatism	4 [1.4]	26 [4.9]	39 [8.7]	69 [5.5]	18.51	<0.00*
Total	18 [6.4]	82 [15.3]	141 [31.5]	241 [19.1]		

Figure 3

Table 3: Age wise distribution of refractive errors according to better eye

Refractive Errors	Age Groups (years)			Total n=1265 [%]	χ^2 Value (df-4)	P Value
	(6-10) n=282 [%]	(10-13) n=536 [%]	(13-15) n=447 [%]			
Myopia	6 [2.1]	34 [6.3]	91 [20.4]	131 [10.4]	76.01	<0.00*
Hyperopia	5 [1.8]	6 [1.1]	6 [1.3]	16 [1.3]	0.399	>0.50
Astigmatism	2 [0.7]	24 [4.5]	39 [8.7]	65 [5.2]	23.64	<0.00*
Total	13 [4.6]	64 [11.9]	136 [30.4]	213 [16.8]		

Table IV shows that all ranges of myopia were more prevalent in girls. The association between the range of myopia and sex of students was not found to be significant.

Figure 4

Table 4: Sex wise distribution of range of myopia

Range (Diopters)	Worse Eye			Better Eye		
	Sex		Total n=1265 [%]	Sex		Total n=1265 [%]
	Boys n=510 [%]	Girls n=755 [%]		Boys n=510 [%]	Girls n=755 [%]	
< -1.0	32 [6.3]	96 [12.7]	110 [8.7]	24 [4.7]	86 [11.4]	110 [8.7]
-1.0 → -1.75	6 [1.2]	12 [1.6]	18 [1.8]	6 [1.2]	10 [1.3]	16 [1.3]
> -2.0	1 [0.2]	6 [0.8]	7 [0.6]	1 [0.2]	4 [0.6]	5 [0.4]
Total	39 [7.7]	114 [15.1]	153 [12.1]	31 [6.1]	100 [13.3]	131 [10.4]
p Value	>0.10			>0.10		
Fisher's Exact Test (df-2)	2.22			2.00		

Table V shows that all ranges of myopia was more prevalent in higher age groups. Myopia with strength >-1.0 D was not found up to age of 10 years in both the tables. The association of range of myopia with age groups was found to be significant.

Figure 5

Table 5: Age wise distribution of range of myopia

Range (Diopters)	Better Eye				Worse Eye			
	Age Groups (years)			Total n=1265 [%]	Age Groups (years)			Total n=1265 [%]
	(6-10) n=282 [%]	(10-13) n=536 [%]	(13-15) n=447 [%]		(6-10) n=282 [%]	(10-13) n=536 [%]	(13-15) n=447 [%]	
< -1.0	6 [2.1]	28 [5.2]	76 [17]	110 [8.7]	9 [3.2]	40 [7.5]	79 [17.6]	128 [10.1]
-1.0 → -1.75	0 [0]	3 [0.6]	13 [2.9]	16 [1.3]	0 [0]	3 [0.6]	15 [3.3]	18 [1.4]
> -2.0	0 [0]	3 [0.6]	2 [0.5]	5 [0.4]	0 [0]	5 [0.9]	2 [0.5]	7 [0.6]
Total	6 [2.1]	34 [6.4]	91 [20.4]	131 [10.4]	9 [3.2]	48 [9.0]	96 [21.4]	153 [12.1]
p Value	<0.01*				<0.05*			
Fisher's Exact Test (df=2)	15.26				11.53			

DISCUSSION

In the present study VA $\leq 6/9$ was taken as defective vision. Out of total (n=1265), 172 children (13.6 %) were found to have defective vision. This finding is similar to those of Gupta et al (2000) ⁴ where prevalence of VA $\leq 6/9$ was found to be 13.2 % in school children (4-12 yrs) of Aligarh. Batra et al (2007) ⁵ also observed the prevalence of VA $\leq 6/9$ in 12.7 % school children (5-15 yrs) from both rural and urban areas of Ludhiana city. Among boys, 46 (9.1%) had defective vision and among girls, 126 (16.7 %) & this difference is statistically significant (p<0.000).The defective vision was significantly associated with increase in age group (p<0.000). According to WHO criterion ⁶ of vision impairment (VA $\leq 6/18$ in better eye) was found in 33 students (2.6 %).

In this study, myopia was found in 153(12.1%) students. In many studies myopia is considered when it is ≥ -0.5 D. In this study myopia of ≥ -0.5 D was found in 111 students (8.75 %) in one or both eyes & in 98 students (7.75 %) in better eye. This finding is similar to those of Murthy et al (2002) ⁷ where 7.4 % prevalence of myopia of ≥ -0.5 D in better eye was found in children (5-15 yrs) of urban population of Delhi. Batra et al (2007) observed myopia of ≥ -0.5 D in 6.97% school children (5-15 yrs) of Ludhiana city (Punjab). Hypermetropia was found in 19 students (1.5 %) in one or

both eyes & in 17 students (1.34 %) in better eye. In this study, the value of hyperopia ranges from +0.25D to +0.75D. In many studies hyperopia is considered when it is $\geq +2.00$ D. In present study it could be underestimated as the presence of accommodative spasm was not taken into account. Astigmatism was found in 69 students (5.46 %) in one or both eyes & in 65 students (5.14 %) in better eye. Myopic astigmatism was more than hyperopic astigmatism. This finding is similar to that of Sethi et al (2000) ⁸ who reported 5.2 % prevalence of astigmatism in school children (12-17 yrs) of Ahmedabad city. It was observed that there was a significant association of increase of myopia (p<0.000) & astigmatism (p<0.000) with older age groups. There was decrease in prevalence of hyperopia with increase in age groups but this association was not found to be significant (p>0.50). Murthy et al (2002) ⁷, Trivedi et al (2006) ⁹, and Batra et al (2007) ⁵ all reported that there was increase in cases of myopia with increase in age. Murthy et al (2002) ⁷ reported decrease in cases of hyperopia with increase in age. In the present study refractive errors were found to be more common in girls (16.7 %) as compared to boys (9 %). This difference was significant statistically. These finding are comparable to those of Batra et al (2007) who reported refractive errors in 14.14 % of girls & in 9.29 % boys. Khurana et al (1984) ¹⁰ also observed higher prevalence of refractive errors in girls (73.53 %) as compared to boys (49.3 %). Batra et al (2007) observed a significant association of hyperopia with females.

Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of the child ¹¹, so it is important to take care of eyes during the development of a child.

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