



Prevalence of Refractive Errors among School Students Aged 6-15 Years in a Rural Block of District Hisar, Haryana

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ABSTRACT

Background: Visual impairment due to refractive errors is one of the most common childhood morbidity and the second leading cause of treatable blindness. School age children, particularly constitute a vulnerable group because of the high prevalence of refractive errors – myopia, hypermetropia, and astigmatism. **Objective:** To find out the prevalence and pattern of refractive errors among school students aged 6-15 years in a rural block of district Hisar, Haryana. **Methodology:** This cross-sectional study was carried out in 4 government schools located in rural area of Agroha block of district Hisar, Haryana. In all, 560 students were included in the study. To cover the desired sample size 140 students (14 students from each class) studying in class 1st to class 5th of each of the selected primary school and 140 students (14 students from each class) studying in class 6th to 10th of each of the selected senior secondary school were randomly selected, interviewed and examined. The primary tool in this study was predesigned and pretested questionnaire for recording of individual information. Statistical analysis was done by using Percentages and chi-square test. **Result:** Prevalence of refractive errors was found to be 17.67% among rural school students. Refractive errors were more in girls (24.64% as compared to boys (10.71%). Myopia (10.5%) was found to be the commonest refractive error followed by astigmatism (5.5%) and hypermetropia (1.6%). **Conclusion:** The prevalence of refractive errors was reported to be 17.67% among rural school children in Agroha block of Haryana. These findings emphasize the need for regular vision screening programs to identify and correct refractive errors, preventing long term visual impairment and improving academic performance.

KEYWORDS: | Refractive errors | School student | Rural

I. INTRODUCTION

Visual impairment due to refractive errors is one of the most common childhood morbidity and the second leading cause of treatable blindness. School age children, particularly constitute a vulnerable group because of the high prevalence of refractive errors – myopia, hypermetropia, and astigmatism¹. When refractive errors are left uncorrected or when the correction is inadequate, they can lead to blurred vision, eye strain and decreased academic performance, ultimately affecting a child's overall development. An estimated 19 million children are visually impaired worldwide of which 12 million are due to refractive errors which could be easily corrected². Furthermore, some 12.8 million in the age group 5–15 years are visually impaired from uncorrected refractive errors, a global prevalence of 0.96%, with the highest prevalence reported in south-east Asia³. Most children with refractive error remain asymptomatic and may not be even aware of their problem. They try to 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 concentration⁴. As children are not mature enough to point out the deficiency at an early stage or the parents have no idea on the gradually developing vision problem, uncorrected refractive error can have a dramatic impact on learning process and educational capacity. Data from 59 quality assessed studies, covering nearly 1,66,000 urban and 1,20,000 rural children showed that the crude prevalence of myopia over last four decades is 7.5% in 5-15-year age group, being 8.5% and 6.1% in urban and rural school going children respectively. The prevalence has increased in rural India from 4.6% in 1980–2008 to 6.8% in 2009–2019, compared to a change from 7.9% to 8.9% in urban India during the same period⁵.

It is estimated that 1.4 billion people were myopic in 2000, and it is predicted that by 2050 the number will reach 4.8 billion⁶. Children spend



considerable amounts of time in reading, studying or more recently using computer and smart phones. Prolonged near work, like reading, writing or screen use without breaks contributes to myopia. The modern rise in myopia among school age children is a concerning trend in many countries because it can lead to significant long-term vision problems and impact their quality of life. As there is a lack of data on the prevalence of refractive errors among school children in Agroha block of Hisar, this study was conducted with the objective of finding out the prevalence and pattern of refractive error among school students aged 6-15 years in Agroha block of district Hisar, Haryana.

II. MATERIAL AND METHODS

Ethical clearance for conducting this study was obtained from the Institutional Ethical Committee. For the purpose of study a list of all government schools located in rural area of Agroha block was taken from the Block Education Office Agroha and 4 schools (2 primary and 2 senior secondary) were randomly selected.

Sample size of 493 was calculated by taking the prevalence of ocular morbidity among school going children between 6-15 years of age as 44.77%⁷ with a permissible level of error of 10%. In all, 560 students were included in the study. To cover the desired sample size 140 students (14 students from each class) studying in class 1st to class 5th of each of the selected primary school and 140 students (14 students from each class) studying in class 6th to 10th of each of the selected senior secondary school were randomly selected, interviewed and examined.

Inclusion criteria:

1. Children aged between 6-15 years.
2. Children who were present on the day of examination.

Exclusion criteria:

1. Children below 6 years and above 15 years.
2. Children who were absent on the day of examination.
3. Children not willing to participate and uncooperative children

A written permission from the district education office (DEO) Hisar was obtained prior to conducting the study. After explaining the purpose of study to the principals of concerned schools, the study subjects were interviewed in their local language and screened by the investigator and those children requiring further evaluation were thoroughly clinically examined by an

ophthalmologist. A predesigned and pretested proforma was used for recording the information. Prior notice was given to all the parents of the concerned students by the school authority about the schedule for the day of examination and consent obtained. The students were screened for refractive disorders by visual acuity testing using Snellen's chart, Jaeger's chart, trail set and retinoscope. Visual acuity (VA) for distance vision was tested separately for each eye with a Snellen chart. The student was seated at distance of 6 metres from the Snellen's chart, so that the rays of light were practically parallel and the student had to exert minimal accommodation. The student was asked to read the chart with each eye separately and visual acuity was recorded as a fraction, the numerator being the distance of student from the letters and the denominator being the smallest letters accurately read. When student was able to read up to 6 meter line the visual acuity was recorded as 6/6 which was taken as normal. 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 children⁸. In children already prescribed spectacles, visual acuity was tested with glasses. Visual acuity for near vision was tested separately for each eye with a Jaeger's near vision chart at distance of 25 cm. A diagnosis of myopia was made if spherical equivalent (SE) refraction was ≥ -0.50 diopter sphere (DS).⁹ Hyperopia was diagnosed when SE was $\geq +2.00$ DS and astigmatism when cylindrical power was $\geq \pm 1.00$ diopter cylinder (DC) in either eye⁹. A child was considered myopic if at least one eye was myopic and hyperopic if at least one eye was hyperopic but neither myopic.

The data thus collected was first coded and then transferred on the MS excel sheet and then exported to Statistical Package for Social Studies (SPSS version 20.0) software from which simple as well as correlative table were prepared, analyzed and statistically evaluated using percentages and chi-square test.

III. RESULTS

As shown in table 1, the percentage of male and female children was 50% each. Maximum number of children (22.32%) belonged to the age group of 12 years and minimum (1.78%) to the age group of 15 years. The maximum numbers of boys (22.85%) were in the age group of 9 years and minimum (2.50%) in the age group of 6 years. The maximum numbers of girls (34.64%) were in the



age group of 12 years and minimum (0.35%) in age group of 15 years.

Table 2 shows that the prevalence of refractive error was 17.67%. Refractive error was more (24.64%) in girls as compared to boys (10.71%) and this difference in refractive error in relation to gender was found to be highly statistically significant ($p < 0.001$).

Table 3 shows that myopia (10.5%) was the commonest refractive error, followed by astigmatism (5.5%) and hypermetropia (1.6%).

IV. DISCUSSION

In the present study, the percentage of male and female children was 50% each. Maximum number of children (22.32%) belonged to the age group of 12 years and minimum (1.78%) to the age group of 15 years. The prevalence of refractive error was found to be 17.67% which is similar to the findings of Singh V et al¹⁰ whereas a higher prevalence of refractive error was reported by Mohanta M et al¹¹ and Rao GN et al¹². In our study, refractive error was more (24.64%) in girls as compared to boys (10.71%). These findings are similar to the findings of Peetha. Mallikarjun Raju et al¹³ et al but in contrast to a study done by Gurung J et al¹⁴ and Mohan A et al¹⁵ who reported a higher prevalence of refractive error among boys. Higher prevalence of refractive error among girls in our study might be due to genetic factors or environmental influences like more near work activities. In our study, difference in refractive error in relation to gender was found to be highly statistically significant ($p < 0.001$) which is similar to the findings of Lusambo NN et al¹⁶ and Abdi AZ et al¹⁷. In the present study, myopia (10.5%) was the commonest refractive error, followed by astigmatism (5.5%). Hypermetropia was the least common refractive error (1.6%). Similar observations were found in studies done by Peetha. Mallikarjun Raju et al¹³, Verma M et al¹⁸ and Aishwarya A et al¹⁹. Whereas, in contrast, astigmatism was reported as the most common refractive error followed by myopia and hypermetropia by Bigyabati R et al²⁰.

V. CONCLUSION AND RECOMMENDATIONS

The prevalence of refractive error in our study was 17.67%. Refractive error was more (24.64%) in girls as compared to boys (10.71%). Myopia (10.5%) was the commonest refractive error, followed by astigmatism (5.5%) and hypermetropia (1.6%). These findings emphasize the need to implement vision screening programs in schools to identify and correct refractive errors,

preventing long term visual impairment and improving academic performance. Teachers of the schools should be briefed about common eye problems and taught how to identify children with ocular problems, so that they can report the same to the child's guardian and necessary action can be taken on time.

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TABLES:

Table 1: Age and Gender wise distribution of children

Age in years	Boys		Girls		Total	
	No.	Percent	No.	Percent	No.	Percent
6	7	2.50	9	3.21	16	2.85
7	10	3.57	9	3.21	19	3.39
8	36	12.85	10	3.57	46	8.21
9	64	22.85	14	5.00	78	13.92
10	31	11.07	35	12.50	66	11.78
11	35	12.50	66	23.57	101	18.03
12	28	10.00	97	34.64	125	22.32
13	46	16.42	30	10.71	76	13.57
14	14	5.00	9	3.21	23	4.10
15	9	3.21	1	0.35	10	1.78
Total	280	50.00	280	50.00	560	100.0

Table 2: Gender wise distribution of refractive error

Refractive error	Boys		Girls		Total		χ^2	p-value
	No.	%	No.	%	No.	%		
Present	30	10.71	69	24.64	99	17.67	18.663	0.000
Absent	250	89.29	211	75.35	461	82.32		
Total	280	100	280	100	560	100		

Table 3: Distribution of children according to types of refractive error

Types of refractive error	Number	%
Myopia	59	10.5
Hypermetropia	9	1.6
Astigmatism	31	5.5
Total	99	17.67