

Original article:

Study of pattern of refractive errors among children of age group 6-16 years in the rural area of Western Maharashtra

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ABSTRACT

Introduction: The commonest cause of visual impairment in children is refractive errors. Undetected and uncorrected refractive errors are significant problem in school children. Present study was aimed to find out pattern of refractive errors in school going children of age group 6-16 years in the rural area of western Maharashtra .

Materials and Methods: This cross-sectional study was conducted in the primary and secondary school of a village. Total 500 children of age group 6-16 years of the selected school were screened for visual acuity testing in the school, using Snellen's Chart for distance and Jaeger's chart for near vision. Children who had difficulty in reading 6/6 and N/6 or less were examined at Department of Ophthalmology Pravara Rural Hospital, Loni with the parent's consent. Refractive errors were confirmed after cycloplegic refraction.

Results: Out of 500 children screened, 82 children were found to have refractive errors. The prevalence of refractive errors was found to be 16.4%. Among 82 children diagnosed to have refractive errors, myopia was the most common refractive error seen in 52 cases (63.41%), followed by astigmatism in 18 cases (21.95%) and hypermetropia in 12 cases (14.64%). As per WHO guidelines for grading of visual impairment it was found that 9.76% cases had moderate visual impairment i.e. visual acuity from 6/24 to 6/60 and 90.24% had mild visual impairment.

Conclusion: Prevalence of refractive errors was 16.4 % in a rural based village school children. Majority of children had visual impairment in the form of simple myopia and low degree astigmatism. Early screening and timely correction of refractive errors plays key role in preventing its consequences.

Keywords: Refractive errors, school children, Eye screening

INTRODUCTION

Among 19 million visually impaired children estimated globally, 12 million children are visually impaired due to refractive errors. Visual impairment from uncorrected refractive

errors can have immediate and long-term consequences in children, such as impaired quality of life, loss of educational and employment opportunities leading to loss of economic gain for the affected individuals,

their families and society in general. In developing countries, children in the school-going age group represent 25% of the population.¹ Among this population refractive errors can be easily diagnosed, measured and corrected to attain normal vision. WHO prioritised the prevention of blindness due to uncorrected refractive errors in children as an important agenda.²

MATERIALS AND METHODS

This cross-sectional study was conducted in the primary and secondary school of a village in the rural field practice area of Pravara Rural Hospital, Loni. Institutional ethical clearance was obtained before starting the study. Permission to do the screening of school children was obtained from school authorities. Total 500 children of age group 6-16 years of the selected school were screened for visual acuity testing using Snellen's Chart for distance and Jaeger's chart for near with the help of experienced optometrist in the respective class. This was followed by detail examination of these children by Ophthalmologists to rule out causes of visual impairment other than refractive errors. Children with ocular pathologies other than refractive errors affecting visual functions were excluded from the study. Those children who had difficulty in reading 6/6 and N/6 or less were listed and these children were further examined with the parent's consent. Refractive errors were confirmed after cycloplegic refraction using homatropine 2% eye drops

RESULTS:

Table No.1: Prevalence of Refractive errors

Refractive errors	No. of cases	Percentage
Not present (Emmetropia)	418	83.6%
Present (Ametropia)	82	16.4%

Among 500 children screened at school, 82 were found to have refractive errors. The

prevalence of refractive errors in our study was found to be 16.4%. (Table No.1)

Table No.2: Pattern of Refractive errors

Pattern of Refractive errors	No. Of cases	Percentage
Myopia	52	63.41%
Hypermetropia	12	14.64%
Astigmatism	18	21.95%
Total	82	100

Out of 82 children diagnosed to have refractive errors, myopia was seen in 52 cases (63.41%), hypermetropia in 12 cases (14.64%) and astigmatism in 18 cases (21.95%).

(Table no. 2).

Table No.3: Age and Refractive errors

Pattern of Refractive errors	Age in years			Total
	6 to ≤9 years	>9 to ≤12 years	>12 to ≤16 years	
	No. of cases	No. of cases	No. of cases	No. of cases (%)
Astigmatism	4	6	8	18 (21.95%)
Myopia	3	15	34	52 (63.41%)
Hypermetropia	8	3	1	12 (14.63%)
Total	15 (18.29%)	24 (29.26%)	43 (52.45%)	82 (100%)

Among the cases of refractive errors, 15 cases (18.29%) were in the age group of 6 to ≤9 years, 24 cases (29.26%) in the age group of >9 to ≤12 years and 43 cases (52.45%) in the age group of >12 to ≤16 years.

Maximum numbers of cases were seen in the age group of >12 to ≤16 years. By applying Chi-square test we found a significant association between age and refractive errors. ($\chi^2=26.473$, $p=0.001$)

Hypermetropia was observed more in children of younger age group and myopia in older age group. Astigmatism was found to be increasing with advancing age. (Table no.3)

Table No.4: Gender and Refractive errors

Pattern of Refractive errors	Gender		
	Male	Female	Total
Astigmatism	8	10	18 (21.95%)
Myopia	21	31	52 (63.41%)
Hypermetropia	5	7	12 (14.63%)
Total	34 (41.46%)	48 (58.54%)	82 (100%)

Among the cases diagnosed to have refractive errors, 34 cases (41.46%) were males and 48 cases (58.54%) were females. There was a female preponderance among children with refractive errors though no statistically significant association was found between gender and refractive errors. ($\chi^2=0.09104$, $p=0.9555$) (Table No.4)

Table 5: Distribution of case according to the degree of Refractive errors

Degree of Refractive errors	Low (<2D)	Moderate (≥ 2 to $\leq 6D$)	Severe (>6D)	Total
Myopia	48	4	0	52 (63.41%)
Astigmatism	18	0	0	18 (21.95%)
Hypermetropia	9	3	0	12 (14.63%)
Total	74	8	0	82 (100%)

Among the total 52 cases of myopia, low degree myopia was seen in 48 cases (92.30%) and moderate degree was seen in 4 (7.70%) cases. 18 cases (100%) of low degree astigmatism were seen. Among the total 12 cases of hypermetropia, low degree hypermetropia was seen in 9(75%) cases and moderate degree was seen in 3 cases (25%).(Table No. 5)

Table No.6: Distribution of cases according to the Refractive types of Regular Astigmatism

Types of Astigmatism	No. of cases
Simple myopic	13
Compound myopic	4
Simple hypermetropic	0
Compound hypermetropic	1
Mixed	0
Total	18

Among the total 18 cases of astigmatism, simple myopic astigmatism was seen in 13 cases (72.23%), compound myopic astigmatism in 4 cases (22.23%) and compound hypermetropic astigmatism in 1 case (5.54%). No cases of mixed or simple hypermetropic astigmatism were observed. (Table No.6)

Table No.7: Distribution of cases of refractive errors according to Visual impairment

Visual impairment	No. of cases (%)
Mild Visual Impairment(6/6-6/18)	74(90.24%)
Moderate Visual Impairment(<6/18-6/60)	8(9.76%)
Severe Visual Impairment(<6/60-3/60)	0
Blindness(<3/60)	0
Total	82(100%)

Among the total study participants diagnosed to have refractive errors, according to the proposed revision of categories for visual impairment² 90.24% of the cases had mild visual impairment and 9.76% cases had moderate visual impairment. No cases in the category of severe visual impairment and blindness were observed. (Table No.7)

DISCUSSION

The prevalence of refractive errors in the present study was 16.4%(Table no.1) and it was comparable to studies done in Haryana by Seema *et al* where the prevalence was 13.65%³ and by Ghosh *et al* in Kolkata where the prevalence was 14.7%⁴. In a study done by Ur Rehman MZ *et al* in Hyderabad the prevalence was 21%⁵ and Sarma *et al* in Guwahati the prevalence was 23.5%⁶, which was higher as compared to our study. These variations in the prevalence data from studies in different areas may be due to different operational definitions used to define the refractive errors in these studies and also may be because of the differences in demographic factors. In our study myopia was the most common refractive error seen in 52 cases (63.41%), followed by astigmatism in 18 cases (21.95%) and hypermetropia in 12 cases (14.64%) (Table No. 2). Similar observations were found in the study done by Rahman M, Devi B, Kuli JJ, Gogoi G.⁷In a study conducted by Dulani *et al*, myopia was seen in 63.4% cases, astigmatism in 25.8% cases followed by hypermetropia in 11.35% cases.⁸ In a study by Sarma *et al*, myopia was found to be the most common refractive error in 81.92%cases, astigmatism was seen in 14.89% cases and hypermetropia in 3.91% cases.⁶

In our study maximum numbers of cases of refractive errors were seen in the age group of >12 to ≤ 16 years (Table No.3). In a study by Manjunath Patil *et al*, refractive errors were most commonly found in the age group of 10-12 years.⁹ Variations seen between different studies may be due to the difference of minimum and the maximum age of children included in different studies.

We found a statistically significant association between age and refractive errors.

In our study hypermetropia was observed more in children of younger age group and myopia in older age group. Astigmatism was found to be increasing with advancing age(Table No.3). In a study by Mittal *et al*, an age related shift of refractive error was

observed from hypermetropia in younger age group towards myopia in the older age group.¹⁰

Although a female preponderance (58.54%) was seen in our study, no statistically significant association was found between gender and refractive errors. (Table No.4) The probable reason for this may be due to negligence towards females in the target group in rural areas.

In our study, maximum myopic patients were found to have low degree myopia in 92.30% followed by moderate degree in 7.70%. Similar results were seen in the study by Sarma *et al*, wherein low myopia was seen in 89.61% cases, and moderate degree in 10.39% cases.⁶

Our study revealed low degree hypermetropia in 75% cases and moderate degree in 25%. This is comparable with a study by Shrestha GS *et al.*, low degree of hypermetropia was seen in 66.7% cases and moderate in 33.3% cases.¹¹

All children had low degree of astigmatism in our study (100%). In a study by Mittal S *et al* low degree of astigmatism was found in 75.20% cases, moderate degree in 16.89% % cases and severe degree in 7.37% % cases and very severe astigmatism in 0.54% cases.¹⁰

Simple myopic astigmatism was the commonest observation in 72.23% cases followed by compound myopic astigmatism in 22.23% cases and compound hypermetropic astigmatism in 5.54% cases (Table no.6). In a study by Hazarika HN *et al*, simple myopic astigmatism was seen in 38.12% cases, compound myopic in 36.36% cases, simple hypermetropic in 12.73% cases, compound hypermetropic in 9.10% cases and mixed in 3.64 % cases.¹² In our study majority of cases had mild visual impairment (90.24%) with 9.76% cases having moderate visual impairment(Table no.7). In a study conducted by Manjunath Patil *et al* also, 94% children had mild visual impairment which is comparable to our study.⁹

CONCLUSION

Timely detection and correction of refractive errors in school going children of a rural area is still the need of time. Although majority of children had mild visual impairment in the form of simple myopia and low degree astigmatism the prevalence of 16.4% is still alarming.

REFERENCES

1. World Health Organization. Preventing blindness in children. Report of a WHO/IAPB scientific meeting. Geneva, 2000. WHO/PBL/00.77;
2. World Health Organization. Prevention of blindness & deafness. Consultation on development of standards for characterization of visual loss and visual function. Geneva: World Health Organization; 4–5 september 2003.
3. Seema S, Vashisht B, Meenakshi K, Manish G. Magnitude of refractive errors among school children in a rural block of Haryana. *The Internet J. Epidemiol.* 2009;2(6):21-4
4. Ghosh S, Mukhopadhyay U, Maji D, Bhaduri G. Visual impairment in urban school children of low-income families in Kolkata, India. *Indian journal of public health.* 2012 Apr 1;56(2):163.
5. Ur-Rehman MZ, Ahmad SR, Syed M. Refractive errors among school-going children in Hyderabad. *International Journal of Medical Science and Public Health.* 2017 Apr 1;6(4):703-7.
6. Sarma KD, Krishnatreya M. A Study on Refractive Errors Among the School Children of Guwahati City. *International Journal of Contemporary Medical Research.* 2016 Aug;3(8):2258-60.
7. Rahman M, Devi B, Kuli JJ, Gogoi G. A study on the refractive status of school going children aged between 10 to 15 years in Dibrugarh Town, Assam, India. *IOSR J Dent Med Sci.* 2015;14(2):27-33.
8. Dulani N, Dulani H. Prevalence of refractive errors among school children in Jaipur, Rajasthan. *Int J Sci Study.* 2014 Aug;2(5):52-.
9. Patil M, Mehta R, Dhamdhare I. Study of prevalence and socio-demographic features of refractive error in children attending secondary school. *Indian Journal of Clinical and Experimental Ophthalmology.* 2016 Jan;2(1):68-71.
10. Mittal S, Maitreya A, Dhasmana R. Clinical profile of refractive errors in children in a tertiary care hospital of Northern India. *Int J Community Med Public Health* 2016;3:1189-94
11. Shrestha GS, Sujakhu D, Joshi P. Refractive error among school children in Jhapa, Nepal. *Journal of optometry.* 2011 Jun 30;4(2):49-55.
12. Hazarika HN, Bhuyan D, Hazarika SC, Addya S. Refractive errors in age group seven to fifteen years: North-east India scenario. *International Journal Of Community Medicine And Public Health.* 2017 May 22;4(6):1928-31.

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