

## **Study of Prevalence of Refractive Errors in School Going Children in the Urban City of Andhra Pradesh**

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**Abstract:** Refractive Errors are one of the avoidable causes of blindness and low vision. Timely detection of these problems and their correction by spectacles can tremendously improve the child's potential during his formative years. Current study was undertaken to evaluate the prevalence of various types of refractive errors and possible risk factors responsible for refractive errors in Indian school going children. A total of 2140 school children were examined for refractive errors. The mean age of the children screened for refractive errors was 12.76 +/- 1.89 years. Of them 55.6% were females and 44.4% were males. The overall prevalence of refractive errors was 9.9%. The prevalence of refractive errors was more in the private school children (15.9%) compared to Government school children (4.6%) and this difference was statistically significant ( $p < 0.0001$ ). Out of 38 children with refractive errors in Government schools only 34.2% children were using prescribed glasses and 65.8% were not using spectacles while among private school children, 56.8% children were using prescribed spectacles and 43.2% children were not using spectacles. Most of the children with refractive errors had myopia (67%). Hypermetropia was seen in 14.1% and astigmatism in 18.9% of the cases which include myopic and hypermetropic astigmatism. Myopia was more common in females compared to male students. This is statistically significant with  $p$  value  $< 0.01$ . Headache, heaviness, cosmetic reasons like not looking good and cost factor for replacement after damage, forgetting glasses at home and concern of teasing about appearance were found to be factors for not using spectacles. It is vital to establish regular screening programs at schools for refractive errors through the existing school health services. Government and policy makers should take initiative for providing school based vision screening, quality optometry services and for providing spectacles at affordable price as part of the school health programmer.

**Keywords:** Refractive Errors, Hypermetropia, Headache, quality optometry.

### **INTRODUCTION**

Refractive Errors are one of the avoidable causes of blindness and low vision. In India refractive error is the second most common cause of blindness. They restrict progress in education and limit career opportunities. Identifying children with refractive error is important since the deficiency in vision may have an impact on the personal as well as academic development of the children. Children, usually do not complain of defective vision especially if only one eye is involved. They may not be even aware of their problem. They adjust to the poor eyesight by sitting near the blackboard, holding the books closer to their

eyes, squeezing their eyes and even avoiding work requiring visual concentration. This evades early detection. High refractive errors if left untreated may lead to development of secondary amblyopia. Timely detection of these problems and their correction by spectacles can tremendously improve the child's potential during his formative years.

So it is essential to understand the patterns of refractive errors in school children to plan effective programs to deal with this problem. Hence the current study was undertaken to evaluate the prevalence of various types of refractive errors and possible risk

factors responsible for refractive errors in Indian school going children.

**MATERIALS AND METHODS**

School children aged 10-15 years studying 6<sup>th</sup> to 10<sup>th</sup> class from 8 randomly selected schools in the city of Kakinada were included in this study. Two distinct types of schools were listed: Municipal Corporation / Government aided schools and privately funded schools. This distinction between schools was made as there is a difference in the socio-economic status (SES) of the children attending these schools. This is a cross sectional observational study conducted over a period of 18 months from January 2015 to June 2016. A total of 2140 students who were present on the day of visit were included in the study. Children with defective vision due to other reasons (Congenital Cataract, Corneal Opacities, Phthisis bulbi, Squint, Microphthalmos, and other congenital abnormalities) were excluded from the study. The study was approved by the institutional ethics committee. Permission for conducting the study in the selected schools was taken from the principals.

Material used for the present study include Snellen’s chart, Retinoscopy, Trail set, Auto refractometer. A participant information sheet explaining their study aims and objectives, the detailed

procedure that would be carried out in the study and any adverse effects of dilatation along with a form to sign for providing the informed consent for the procedure was sent to all the parents. Examination was done during school hours.

All those children unable to read the 6/9 letters or those previously wearing spectacles were referred to an ophthalmic technician for refraction. All children with refractive error and prescribed with spectacles were provided spectacles at concessional rate. All the data from structured questionnaire was entered in Microsoft XL spreadsheet. The data was presented in numbers and frequencies. The p value < 0.05 was considered statistically significant. The statistical analysis was carried out using STATA software 13.0 (College Station, USA).

**RESULTS**

2140 school children were examined for refractive errors. The mean age of the children screened for refractive errors was 12.76 +/- 1.89 years. Of them 55.6% were females and 44.4% were males. During initial screening with Snellen’s charts, 231 children were found to have vision < 6/6. After complete refraction 212 children were found to have refractive errors. The overall prevalence of refractive errors was 9.9%.

**Table-1: Age wise distribution of students with or without refractive errors**

Age group in years	Refractive errors		Total
	Present (%)	Absent (%)	
10	30 (9.4)	290 (90.6)	320
11	30 (12.5)	210 (87.5)	240
12	29 (7.1)	378 (92.9)	407
13	41 (15.6)	221 (84.4)	262
14	40 (8.1)	455 (91.9)	495
15	42 (10.1)	374 (89.9)	416
Total	212 (9.9)	1928 (90.1)	2140 (100)

The prevalence of refractive errors was more in females (10.9%) than in males (8.6%) as shown in table 2. Table 3 shows that the prevalence of refractive errors was more in the private school children (15.9%)

compared to government school children (4.6%) and this difference was statistically significant (p < 0.0001).

**Table-2: Gender wise distribution of Students with refractive errors**

Sex	Refractive error		Total
	Present (%)	Absent (%)	
Male	82(8.6)	868(91.4)	950
Female	130(10.9)	1060(89.1)	1190
Total	212(9.9)	1928 (90.1)	2140(100)

**Table-3: Prevalence of refractive errors in Government Vs Private school children**

School	Refractive error cases		Total
	Present (%)	Absent (%)	
Government school	53(4.6%)	1087(95.4%)	1140
Private school	159(15.9%)	841(84.1%)	1000
Total	212	1928	2140
p < 0.0001			

Out of 53 children with refractive errors from Government schools 38 (71.7%) were previously diagnosed and 15 (28.3%) were found to have refractive error during the present study. 20 out of 159 children (12.5%) with refractive errors from private schools were detected during the present study (table

4). Out of 38 children with refractive errors in government schools only 34.2% children were using prescribed glasses and 65.8% were not using spectacles while among private school children, 56.8% children were using prescribed spectacles and 43.2% children were not using spectacles (table 5).

**Table-4: Demographic profile of refractive errors**

	Total children with refractive errors	Newly diagnosed children	Previously diagnosed / known refractive cases
Government schools	53	15(28.3%)	38(71.7%)
Private schools	159	20(12.5%)	139(87.5%)
p < 0.01			

**Table-5: Compliance of visual aids in school children**

	Previously diagnosed / known refractive cases	Not using spectacles	Using spectacles
Government schools	38	25 (65.8%)	13 (34.2)
Private schools	139	60 (43.2%)	79 (56.8)

**Table-6: Type of refractive errors and gender distribution of refractive errors**

Type of refractive errors	Number of children		Total (n = 212)
	Males	Females	
Myopia	45	97	142 (67)
Hypermetropia	22	8	30 (14.1)
Astigmatism	15	25	40 (18.9)

Type of refractive errors and Gender distribution of refractive errors is given in table 6. Most of the children with refractive errors had myopia (67%). Hypermetropia was seen in 14.1% and astigmatism in 18.9% of the cases which include myopic and hypermetropic astigmatism. Myopia was more common in females compared to male students. This is statistically significant with p value < 0.01). Hypermetropia was more common in males compared to female students and is statistically significant (p value < 0.0001) (table 6).

**DISCUSSION**

Refractive Errors are one of the avoidable causes of blindness and low vision. In this cross sectional study, 2140 children were examined for refractive errors. 212 children were found to have refractive errors, the overall prevalence being 9.82%. The prevalence of refractive errors in various other studies varied from 5.65% to 25.32%. This implies that refractive error is a significant public health problem.

In the present study there was no significant age difference in the prevalence of refractive errors. Cho P *et al.* [1] reported the incidence of myopia to be age related. In his longitudinal study on development of myopia in Hong Kong children between the ages 7-12 years, it was found that myopia prevalence in children aged 7-8 years was 9% where as it was 18.2% in children of 11-12 years.

In the present study, refractive errors were more prevalent in female children (10.92%) compared to male children (8.6%) and this difference was statistically insignificant (p=0.05). Higher prevalence of refractive errors in females compared to males was found in many other studies [2-4].

In the present study, it was also observed that refractive errors were more prevalent in private school children (15.9%) compared to government school children (4.64%). This difference was statistically significant (p<0.0001). This was similar to a study conducted by Niroula DR *et al.* [5].

When we compared newly diagnosed cases of refractive errors in Government schools and Private schools, we found that out of 53 children with refractive errors in Government schools, new cases were 15 (28.3%), while the percentage of newly diagnosed children with refractive errors in private schools was only 12.5% (20 out of 159 cases) which was statistically significant with p value< 0.01. This emphasizes the need for more active surveillance of refractive errors in government schools. We also observed that, out of 38 children with refractive errors in government schools only 18 (42%) children were using prescribed spectacles while in the private schools, 79 (57%) children with refractive errors were using spectacles prescribed.

More children with refractive errors from private schools were wearing spectacles compared to

government schools possibly are due to better awareness and greater health seeking behavior among children in private schools. Hence regular counseling of both parents and children and also motivation of children by parents and school teachers to wear spectacles is necessary.

Various factors found to be responsible for not using spectacles in Government schools were complaints of headache, heaviness, and cosmetic reasons like not looking good and cost factor for replacement after damage. However in children of private schools, factors other than financial burden played important role in noncompliance like spectacles causing headache, forgetting glasses at home and concern of tease about appearance.

In the present study, out of 212 confirmed cases of refractive errors, Myopia was the most common type of refractive error (62.3%) followed by hypermetropia seen in 14.2% of the cases and astigmatism was seen in 18.9%. These results are comparable to study conducted by Sonam Sethi G *et al.* [6].

Identifying children with refractive error is important since the deficiency in vision may have an impact on the personal as well as academic development of the child. High refractive errors if left untreated may lead to development of secondary amblyopia. Timely detection of these problems and their correction by spectacles can tremendously improve the child's potential during his formative years. In India the school eye screening programmer should be strengthened to ensure annual screening of children and provision of spectacles at subsidized price.

## CONCLUSION

Refractive Errors is a significant cause of visual impairment among school children and screening of school children can play an important role in detecting refractive errors. Students, parents and teachers must be educated about signs and symptoms of refractive errors so that they are detected early and corrected with spectacles to prevent progression of visual impairment. It is vital to establish regular screening programs at schools for refractive errors through the existing school health services. Government and policy makers should take initiative for providing school based vision screening, quality optometry services and for providing spectacles at affordable price as part of the school health programmer.

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