

## Original Research Article

# A study on the prevalence of refractive errors among school children of 10-16 years in Surendranagar district, Gujarat

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## ABSTRACT

**Background:** Refractive error could be considered as an avoidable condition among various conditions leading to visual disabilities in children. Present study was conducted with the objective of estimating the prevalence of refractive errors among school children in Surendranagar district.

**Methods:** The study was conducted among the school going children of 10-16 years age group of Surendranagar district of Gujarat state. Total 600 students were examined from rural and urban schools of the district. The study was carried out through oral questionnaire method using pre-designed and pretested Performa followed by ocular examination.

**Results:** Overall prevalence of refractive errors was found to be 29.5%. Headache was the single most common symptom reported by 38.58% children. Nearly 36.54% boys and 36.98% girls had moderate visual impairment while 4.80% boys and 2.75% girls had severe visual impairment. Among the children having refractive errors 61.02% children did not use spectacles.

**Conclusions:** The study shows that children among 10-16 years are at risk of developing refractive errors and many of them are not aware of the refractive errors.

**Keywords:** Refractive errors, school children, prevalence, symptoms, spectacles

## INTRODUCTION

Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness.<sup>1</sup> A Refractive Error Study in Children (RESC) in India showed, hyperopia present in 7.7% of children and myopia in 7.4%.<sup>2</sup>

An upward trend of myopia was noted coinciding with school entry (7-8 years) and 11-14 years age around pubertal growth spurt.<sup>3</sup> Screening programs are designed to target these age groups in school health screening

programmes especially in resource poor countries.<sup>4</sup> It is a great challenge to reduce the barriers among the children to procure and regularly wear the glasses.<sup>5,6</sup> The present study was conducted to find out the prevalence of refractive errors in school going children.

### Objectives

1. To find out the prevalence of refractive errors among school going children.
2. To find out the various symptoms reported by school children.

- To assess the use of spectacles among school going children of rural and urban areas of Surendranagar.

## METHODS

A cross-sectional study was conducted in urban and rural schools of Surendranagar district of Gujarat state. Pilot study was conducted and prevalence was found to be 40%. The sample size was calculated as per statistical calculation,  $n=4pq/l^2$  where  $p=40$ ,  $q=60$ ,  $l=10\%$  of  $p$ . The sample size calculated was 600. List of all the schools in the district was prepared and 4 schools were randomly selected. The total number of schools in Surendranagar District is 206. Out of them one school was selected randomly in urban area opposite mela medan area. All the villages of Surendranagar district were listed, one village was selected randomly. A list of all the schools in the village was prepared. Out of these, three schools were selected randomly. 300 students in the age group of 10-16 years from this school were examined.

Total 600 school children aged 10-16 years were examined, 300 students from rural area and 300 from urban area. The study period was from August 2012 to January 2013.

The study was carried out through oral questionnaire method using pre-designed and pretested performa followed by ocular examination. Socio-demographic details were taken like age, sex, residential address etc. Students were examined in the presence of teachers.

Vision test was carried out for distant as well as near vision. For distant vision Snellen's chart was used. The chart was placed on a wall at a distance of 6 meters from the students. Care was taken to provide sufficient light on the chart. Each eye was tested one by one keeping the other eye covered. Near vision was tested with the help of Jaeger's chart keeping the distance of 25-30 cm from the eyes of the subjects.

The children were screened for refractive errors. Children with visual acuity of 6/9 to 6/18, 6/24 to 6/60 and less than 6/60 in the better eye were categorized as having mild visual impairment, moderate visual impairment and severe visual impairment respectively.<sup>7</sup> Teachers were informed about children who had visual acuity equal or less than 6/12 and other ocular problems.

All information was collected, compiled and analysed by applying suitable tests. The Statistical software namely SPSS (Statistical package for Social Sciences) was used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

## RESULTS

The present study was conducted among 600 school children aged 10-16 years. The results of interview and ocular examination are presented below.

Overall prevalence of refractive errors was found to be 29.5%. Table 1 shows the prevalence of refractive errors according to the socio-demographic characteristics like Age, sex and area.

**Table 1: Prevalence of refractive errors according to area, sex and age.**

Variables	Refractive errors (n=177)		
	Frequency	%	P value
<b>Area</b>			
Urban	90	50.84	0.788
Rural	87	49.16	
<b>Sex</b>			
Boys	95	53.67	0.014
Girls	82	46.33	
<b>Age</b>			
10-11	40	22.59	0.012
12-13	75	42.39	
14-16	62	35.02	

Difference in the refractory error between boys and girls was statistically significant ( $p<0.05$ ), while no statistical difference was found between rural and urban area. The difference in the prevalence of refractive errors according to age was significant ( $p<0.05$ ).

**Table 2: Frequency of the various symptoms reported by children with refractive errors.**

Different symptoms	Frequency (No.)	Percentage (%)
Headache	71	38.58
Difficulty to see distant objects	59	32.06
Difficulty to see in dim light	23	12.5
Eye strain	31	16.86

Common complaints reported by school children with refractive errors were noted. Headache was the single most common symptom reported in 38.58% children while 32.06% children complained of difficulty to see distant objects.

It was observed that 36.72% had moderate visual impairment and 3.96% children had severe visual impairment. Nearly 36.54% boys and 36.98% girls had moderate visual impairment while 4.80% boys and 2.75% girls had severe visual impairment (Table 3).

Among the children having refractive errors 61.02% children did not use spectacles. Reasons narrated by children were that they were not aware of their condition (75.92%), did not like wearing spectacles due to cosmetic reasons (16.68%) and 7.40% children gave multiple answers like their parents did not allow them to wear, wearing spectacles increases the number.

**Table 3: Distribution of children with refractive errors according to visual acuity.**

Visual impairment	Boys		Girls		Total	
	No.	%	No.	%	No.	%
<b>Mild impairment</b>	61	58.66	44	60.27	105	59.32
<b>Moderate impairment</b>	38	36.54	27	36.98	65	36.72
<b>Severe impairment</b>	5	4.8	2	2.75	7	3.96
<b>Total</b>	104	100	73	100	177	100

**Table 4: Use of spectacles in children with refractive errors.**

Using spectacles	Children with refractive errors	
	No (n=177)	%
Yes	69	38.98
No	108	61.02
<b>Reasons for not using spectacles</b>		
Not aware of the condition	82	75.92
Cosmetic appearance	18	16.68
Others *	8	7.40
<b>Total</b>	108	100

\*Others: Parents do not allow wearing spectacles, anticipation of teasing from other Students and widespread false believes about the harmful effect of glasses on vision.

## DISCUSSION

Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of a child. Moreover, planning of the youth's career has a strong relation with visual acuity. Refractive errors are the most common reasons for a visit to an ophthalmic surgeon or an ophthalmic assistant.<sup>8</sup>

Overall prevalence of refractive errors in the present study was 29.5%. Similar prevalence of refractive errors has been observed among children of 12-17 years in a study in Ahmedabad city.<sup>9</sup> In another study from South India, higher (32%) prevalence of refractive errors was noted as compared to the present study.<sup>10</sup> In rural Maharashtra 36.62% prevalence of ocular morbidity was observed.<sup>11</sup> Internationally, lower prevalence of refractive errors (2.7-5.8%) has been reported among children of age 5-15 years from Africa, Chile and Nepal as compared to the present study.<sup>12-14</sup> These differences may be explained by the different diagnostic criteria used by different authors, racial or ethnic variations in the prevalence of refractive errors, different lifestyles or living conditions (e.g. reading, watching TV, or using computer/ visual display units, nutrition) or medical care (e.g. unnecessary or overcorrection of refractive errors which may worsen the refractive error by inhibiting natural "emmetropisation").<sup>8</sup> In the present study prevalence of visual acuity between 6/24 to 6/60 was 36.72% and V/A <6/60 was in 3.96%. In a similar study conducted in central India 28.78% children had V/A between 6/24 to 6/60 and 5.67% had V/A <6/60.<sup>15</sup>

The prevalence of refractive errors according to age showed that the prevalence is more among older children 14-16 years (35.02%) and 12-13 years of age (42.39%)

compared to 10-11 years age group (22.59%). The findings were similar to other studies.<sup>16-18</sup> The higher prevalence reported in older children could be due to better articulation and detection of visual problems by older children, suggesting a lack of detection by parents and teachers at younger ages.

On looking at the prevalence of refractive errors sex wise, boys had 53.67% prevalence in comparison to girls (46.33%). In other studies refractive errors were found more commonly in girls than in boys, probably related to the rate of growth.<sup>19,20</sup> Girls attain puberty earlier on an average and reach their final body weight 1-2 years earlier than the boys.<sup>10</sup>

Among the children with refractive errors 38.98% were using spectacles while 61.02% were not using the spectacles similar to the study in rural Maharashtra where 42.85% children were using spectacles.<sup>11</sup> The reasons given were 75.92% were not aware of their condition, 16.68% did not like wearing spectacles due to cosmetic appearance and 7.40% children gave multiple answers. Barriers to the use of corrective spectacles include: parental awareness of the vision problem, attitudes regarding the need for spectacles, spectacle cost, cosmetic appearance, and concerns that wearing glasses may cause progression of refractive error.<sup>21</sup> From a public health perspective; vision screening is an appropriate strategy to reduce vision impairment. Most of this impairment is caused by refractive error, for which treatment is simple, effective, and inexpensive.

## CONCLUSION

Most refractive errors can be easily corrected with spectacles and because visual impairment can have a

detrimental impact on education and development in a child's life, cost-effective strategies to eliminate this easily treatable cause of visual impairment should be warranted. The study has illustrated the need to screen young children regularly in school. This will enable identification of those with visual disability so that corrective measures may be recommended at the earliest time possible.

The study shows that children among 10-16 years are at risk of developing refractive errors and many of them are not aware of the refractive errors. The importance of wearing spectacles among those with refractive errors and effects of not using them should be explained to children.

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