

# Refractive errors among school-going children in Hyderabad

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## ABSTRACT

**Background:** Uncorrected refractive error is the leading cause of eye problem worldwide. Children are more vulnerable because it starts in school age and can hinder the learning process and educational achievement. **Objectives:** The objectives of the study were to assess the prevalence of known case of refractive error among school-going children and its socioeconomic characteristics, and attitude of the students toward corrective measure. **Materials and Methods:** A study was conducted among school-going children from 6<sup>th</sup> to 10<sup>th</sup> standard from three schools. Permission was taken from the respective school's authority and consent was taken from parents through school. Each school had about 300 students, making a total of 900. Students are known to have refractive errors were included in the study. Out of 900, 190 were known to be affected. Data were collected using predesigned questionnaire and analyzed by appropriate statistical tests. **Results:** The prevalence of known case of refractive error was 21%. Maximum (51%) were between 11 and 12 years of age. About 95% of affected students had myopia. Majority of the students (54.2%) had blurring of vision as their initial complaint. Regarding family history of refractive errors, 65% of the student's fathers were affected, 49% mothers were affected, and 43% of the siblings were affected. Almost 100% of the students used glasses and only 50% of the students get their eyes checked every 6 months. About 48% of students spent >2 h in front of screen and 47% students spent <2 h in outdoor activities. **Conclusion:** The prevalence of refractive error was very high; hence, school health services including eye screening should be given special attention.


**KEY WORDS:** Hypermetropia; Myopia; Refractive Errors; School Children

## INTRODUCTION

The latest global estimates of visual impairment suggest that an estimated 2.3 billion people worldwide have a refractive error and among children aged 5-15 years, 12.8 million were visually impaired due to refractive errors representing a prevalence of 0.97% with higher prevalence reported in China and urban areas of Southeast Asia.<sup>[1]</sup> In India, over 70% of the urban population in South India had refractive errors.<sup>[2]</sup> In a study in Delhi found that 6% of school-going children

are having refractive error and 3/4<sup>th</sup> of them are myopic.<sup>[3]</sup> In another study in Delhi also found that refractive error was 7.5% among school-going children between age group of 5 and 15 years.<sup>[4]</sup>

Two major types of refractive errors are myopia and hypermetropia. Myopia or nearsightedness is the most common refractive error of eyes. Myopia occurs when the eyeball is too long, relative to the focusing power of the cornea and lens of the eye. Nearsightedness also can be caused by the cornea or lens being too curved. In some cases, myopia is due to a combination of these factors.<sup>[5]</sup> Myopia typically develops at approximately 8 years of age and progresses through 15-16 years of age, the average rate of progression is approximately 0.5 diopter/year.<sup>[6]</sup> Genetics appear to play a role in determining the child's refractive error status. The risk of becoming myopic increases with the number of myopic parents.<sup>[6]</sup> Near work, such as studying or

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using a phone, affects the eye and is suspected to be a risk factor for myopia.

Spending more time outdoors has been shown to decrease the likelihood of becoming myopic but does not slow down the progression of myopia.<sup>[6]</sup> Some schools in Taiwan were randomly assigned to encourage outdoor activities during recess while other schools maintained their normal routine. In the schools that encouraged more outdoor activities, only 8.4% of children became myopic compared to 17.7% in the schools that maintained their normal recess activities.<sup>[6]</sup> Modern technology is changing the lifestyle; hence, children are spending lot of time in front of television (TV) or computers. This leads to tribulations in their vision. If the problems are unnoticed, they will suffer in future from visual impairment and they may even lose their vision completely.<sup>[7]</sup> Hence, this study was undertaken with the objectives to assess the prevalence of known case of refractive error among school-going children and its socioeconomic characteristics, and the attitude and practice of the students toward corrective measure.

## MATERIALS AND METHODS

A cross-sectional study was conducted among school-going children between August and September 2016. School-going children from 6<sup>th</sup> to 10<sup>th</sup> standard from three schools in the field practice area of Deccan College of Medical Sciences, Hyderabad, Telangana, were selected as study population. Study was approved by the Ethics Committee of the Institution. Prior permissions were taken from the respective schools authorities and consent was taken from parents through school. Each school had about 300 students, making a total of 900. Students known to have refractive errors were included in the study. We visited the schools on dates and time given by school authorities. Out of 900, 190 were known to be affected. We had demonstrated and distributed predesigned questionnaire to the affected children. The data were collected and analyzed by appropriate statistical tests.

## RESULTS

Out of 900 students in 3 schools, 190 were known to be affected with refractive error; hence, the prevalence of known case of refractive error was 21%. The mean age of the affected students was 12.42 years (standard deviation [SD] = 1.55). The mean duration of the students affected was 2.9 years (SD = 2.13). About 6% of the children affected with refractive errors were from the age group 9-10 years, 51% were between 11 and 12 years, 30% were 13-14 years, and remaining 13.2% were 15-16 years of age. The total males affected were 53.7% and the remaining 46.3% were females. The lowest incidence was seen in 4<sup>th</sup> and 5<sup>th</sup> grade with only 0.5% each. Maximum was in 6<sup>th</sup> grade with 32.6%, 7<sup>th</sup> grad had 24.2%, 8<sup>th</sup> grade had 7.4% of the affected students, 9<sup>th</sup> had

19.5%, and 15.3% belong to 10<sup>th</sup> grade (Table 1). About 95% of students were affected with myopia and only 4.7% with hypermetropia. Only 5.3% had the error for less than a year, 49% for 1-2 years, 25% for 3-4 years, and 19% for 5-6 years. Majority of the students (54.2%) had blurring of vision as their initial complaint while 25.3% said headache was their first symptom and only 3.2% had no initial complaint. About 97% of the students had no other associated eye disease. Almost 100% of the students used glasses, and mere 5.8% used lenses as well. Around 54% of students would prefer to wear lenses while the remaining 46% would not. About 41% would like to get corrective surgery later while 59% would not (Table 2). Regarding family history of refractive errors, 65.3% of the student's fathers were affected, out of which 25.3% had hypermetropia and the remaining 40% had myopia while out of 49.5% affected mothers, only 14.5% had hypermetropia, and the remaining 35% had myopia. About 43.7% of the siblings were affected, 42% siblings had myopia, and 1.6% had hypermetropia (Table 3). About follow-up, 50% of the students get their eyes checked every 6 months, 41.6% every year, and remaining 8.4% get it checked every 2 years. Regarding time spent in front of screen, 51.6% of students spend 1-2 h, 30.5% spend 2-4 h, 12.1% spend 4-6 h, 3.7% spend 6-8 h, and 2.1% spend 8-10 h in front of the screen while about outdoor activities 47.9% of students spend 1-2 h, 41.6% spend 2-4 h, 10% spend 4-6 h, and only 0.5% spend 6-8 h in outdoor activities. About 43% of the students had a good experience with glasses while 40% had a bad experience and remaining 17% had an okay experience. About 40% of those who had good experience would like to wear lenses while 54% of okay experience and 69% of those who had bad experience would like to wear lenses that means bad experience with glasses was related to the likelihood of wearing lenses (Table 4). About 12% said they were uncomfortable with wearing glasses while 16% said that it helped them see clearly, 4% had a problem while playing sports, and 8% said they were okay with wearing glasses. About 8.4% had been wearing it for a while and got used to it. Around 27% like wearing glasses, they think it makes them look good while 22% said they did not like

**Table 1:** Characteristics of study population (n=190)

Variable	Categories	Frequency (%)
Age	9-10	11 (5.8)
	11-12	97 (51.1)
	13-14	57 (30.0)
	15-16	25 (13.2)
Sex	Male	102 (53.7)
	Female	88 (46.3)
Standard	6	64 (33.6)
	7	46 (24.2)
	8	14 (7.4)
	9	37 (19.5)
	10	29 (15.3)

wearing them and only 1% said they were made fun off for wearing glasses.

**DISCUSSION**

We had conducted this study in 3 schools in Hyderabad city of Telangana state, India; among students of 6<sup>th</sup> to 10<sup>th</sup> standard who already had refractive errors. In our study, the prevalence of refractive error was 21% which was slightly lower than a study conducted in Imphal, which found prevalence of refractive error 29%.<sup>[8]</sup> This may be because, in Imphal study, they have done screening and we have taken known case of refractive errors. In this study, 53 % were boys and 47% were girls. In a study conducted in Iran also found that there was no intersex difference in the incidence of refractive errors.<sup>[9]</sup> This study’s finding of mean age of the affected students (12.42 years) was similar to other studies.<sup>[10-12]</sup> In this study, we found that only 22% students did not like wearing glasses while a study conducted in Pune showed that 12% of the children did not like to wear glasses.<sup>[11]</sup> This study found that myopia was common refractive error which was similar to other studies conducted in different countries such as Ethiopia

(2014),<sup>[2]</sup> Saudi Arabia (2013),<sup>[13]</sup> and Nepal (2011).<sup>[14]</sup> It was suggested that children between the age of 7 and 15 years with myopia should visit the ophthalmologist once every 6 months but we found that only 50% of the students get their eyes checked every 6 months while 41.6% get their eyes checked yearly.<sup>[15]</sup> This study found that a positive family history was an important risk factor in developing the refractive error. A similar study states that if one or both the parents have refractive errors, their children definitely have the problem in their vision.<sup>[7]</sup> A study conducted by Saxena et al., in Delhi, showed positive association between myopia and activities such as studying/reading, watching TV, and playing computer/video/mobile games.<sup>[3]</sup> However, in this study, we found that majority (52%) of the students spent only 1-2 h in front of the screen. This may be because of change in habits after refractive errors. We found that all the students use glasses and mere 6% use lenses as well, but majority would prefer to wear lenses compared to a study in Saudi Arabia, where only 9.4% of the affected students wore glass.<sup>[13]</sup> A study conducted by Dias et al. showed that those who chose to wear contact lenses had higher social acceptance.<sup>[16]</sup> Below 12 years of age most optometrists suggest glasses as the primary method of vision correction and contact lenses as a secondary correction. As children get older, optometrists begin to change their approach to vision correction as 66% recommending contact lenses as the main form of vision correction for 15-17-year olds.<sup>[17]</sup> This study found that 41% would like to get corrective surgery later. Most surgeons do not recommend performing laser-assisted *in situ* keratomileusis (LASIK) on children except in extreme cases. A child’s eye is not fully developed until adulthood or about age 18. Since children’s eyes are constantly adjusting and changing shape, surgery would only provide a temporary improvement to their vision. Indeed, a child who has undergone LASIK will probably need corrective surgery down the road. In addition, surgery is normally performed on adult patients who are fully awake; restless children might have to be heavily sedated to remain still.<sup>[18,19]</sup>

**CONCLUSION**

From this study, we can conclude that refractive error is an important cause of visual impairment among school-going children and if it not corrected early, it may lead to complete vision loss. Visual impairment in school children may affect education and career development. Hence, it is responsibility of teacher and parents to do periodic eye checkup, minimize screen time, and encourage them to wear spectacles.

**Table 2:** Characteristics of refractive errors in study population

Variables	Categories	Frequency (%)
Type	Myopia	181 (95.3)
	Hypermetropia	9 (4.7)
Duration (years)	<1	10 (5.3)
	1-2	94 (49.4)
	3-4	49 (25.7)
	5-6	37 (19.4)
Initial complaints	Blurring of vision	103 (54.2)
	Headache	48 (25.3)
	Both the above	33 (17.4)
	None	6 (3.2)
Associated diseases	None	184 (96.8)
	Allergy	2 (1.1)
	Astigmatism	1 (0.5)
	Dryness	1 (0.5)
	Lazy eyes	2 (1.1)
	Corrective measures	Use glass
	Use lens also	11 (5.8)
	Would like to wear lens	103 (54.2)
	Would like to get corrective surgery	78 (41)

**Table 3:** Family history of refractive errors

Family members	Myopia (%)	Hypermetropia (%)	Total affected (%)	Not affected (%)
Father	76 (40)	48 (25.3)	124 (65.3)	66 (34.7)
Mother	67 (35)	27 (14.5)	94 (49.5)	96 (50.5)
Siblings	80 (42.1)	3 (1.6)	83 (43.7)	107 (56.3)

**Table 4:** Association of wearing lenses with experience of glass

Experience	Would like to wear lenses		Total (%)
	Yes (%)	No (%)	
Good	33 (40.2)	49 (59.8)	82 (100)
Bad	52 (69.3)	23 (30.7)	75 (100)
Ok	18 (54.5)	15 (45.5)	33 (100)
Total	103 (54.2)	87 (45.8)	190 (100)

Chi square=13.35, df=2, P=0.001

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