

# A Study on Ocular Morbidity among School-Going Children (6–12 Years) – A Cross-Sectional Study

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## Abstract

**Introduction:** School health is an essential aspect of any community health program. The school age is a formative period, physically and mentally, transforming the child into a promising adult. Poor vision in childhood affects performance in school and negatively influences the child's future life.

**Aim:** This study aimed to assess the prevalence and associated factors related to ocular morbidity among primary rural school-going children (age 6–12 years).

**Materials and Methods:** This cross-sectional study was carried out from December 2018 to December 2019 in almost six primary schools in Kallur Block in the Tirunelveli district from the first to fifth standard (6–12 years). The Institutional Ethical Clearance and appropriate permissions from the school authorities were obtained through the medical officer of Kallur PHC and consent 51 from the parents.

**Results:** Out of 500 participants based on the age group, the participants were highest in 10–12 years of age group, 22%. The remaining distribution was 20.8% in 7 years of age, 20.4% in 9 years of age, 19.8% in 8 years of age, and 17% in 6 years of age. The participants were highest in the female, which was 54.8% and 45.2% in males. The blurring of vision was the most common complaint reported by 40.2% of the study participants. The prevalence of total ocular morbidity among our study participants was 15.4%.

**Conclusion:** This study proves that the risk factors associated with refractive error can be avoided, and creating awareness among children, parents, and teachers play an essential role in preventing visual impairment.

**Key words:** Children, Morbidity, Ocular, Refractive error, Vision

## INTRODUCTION

School health is an essential aspect of any community health program. The school age is a formative period, physically and mentally, transforming the child into a promising adult. Poor vision in childhood affects performance in school and negatively influences the child's future life. Schoolchildren are affected by various eye disorders such as refractive errors, squint, Vitamin A deficiency, and eye infections. Uncorrected refractive errors form one of the

important causes of visual impairment and blindness in most developing countries, including India. Because 30% of India's blind lose sight before the age of 20 years, the importance of early detection and treatment of ocular morbidity, and visual impairment in young children is evident.<sup>[1,2]</sup> This warrants early detection and treatment of ocular problems to prevent future blindness.

According to the WHO (Globally), among adults, there are 39 million people blind, and 246 million are visually impaired, and among children, there are 1.4 million blind and 18.9 million are visually impaired. Uncorrected refractive errors are the leading cause of visual impairment.<sup>[3]</sup> According to the National Programme for Control of Blindness and Visual Impairment, there are 9 million blind and million visually impaired adults. Among children, 2.7 lakh are blind, and 0.3/1000 are visually impaired.<sup>[4,5]</sup>

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Common ocular morbidities in schoolchildren are refractive error, amblyopia, color blindness, Vitamin A deficiency allergic conjunctivitis, infectious conjunctivitis, blepharitis chalazion, stye, congenital cataract, traumatic cataract, squint, and ptosis.

A normally developed eye (by 5–6 years of age) acts as a convex lens of +60D. This power is divided into two major components, that is, the corneal and lenticular. The converging power of the cornea is +43D.<sup>[6]</sup> This leaves the lens with +17D of power; normal aqueous and vitreous contribute a negligible converging power. In an eye with normal refractive (dioptric) power, parallel rays are brought to focus on the retina with accommodation at rest; the parallel rays form a circle of least diffusion.<sup>[7]</sup> This refractive status is called emmetropia. In contrast to this, if all parallel rays are not brought to focus on the retina in all the meridian with accommodation at rest, the condition is called ametropia.<sup>[8]</sup>

A full-term normal child at birth is about +2 to +3D hypermetropic. This is due to the shorter axial length of the newborn's eyeball. As the child grows, this power is neutralized by the eyeball's corresponding lengthening up to 5–7 years when all eyes should become emmetropic. However, if the increase in length does not stop at this point, the eye becomes myopic, and if the eye fails to reach the emmetropic length (24 mm), the eye becomes hypermetropic.<sup>[9]</sup>

### Aim

This study aimed to assess the prevalence and associated factors related to ocular morbidity among primary rural school-going children (age 6–12 years).

## MATERIALS AND METHODS

This cross-sectional study was carried out from December 2018 to December 2019 in almost six primary schools in Kallur Block in Tirunelveli district. The study population comprised students from the first to fifth standard (6–12 years). Inclusion criteria include children age group 6–12 years, both males and females, visual acuity <6/9, and improving with pinhole was considered to be refractive error, strabismus was diagnosed by recording corneal light reflex combined with extraocular movements and cover-uncover tests, a probable diagnosis of amblyopia was made, if the vision was <6/9, not improving with pinhole and no organic lesions were detected after the complete ocular examination.

Exclusion criteria include children below 6 years and above 12 years, children's absence on the day of examination,

and children with previous ocular surgery or any ocular disease. The Institutional Ethical Clearance and appropriate permissions from the school authorities were obtained through the medical officer of Kallur PHC, and consent from the parents was obtained. A complete history was taken from the students and parents. Complete eye examination of both eyes was carried out in all students, and free of cost, referral, and treatment were provided at Tirunelveli Medical College and Hospital.

Eye examination of each student included torchlight examination of the eye and adnexa. Visual acuity for distance vision was tested separately for each eye with a Snellen chart at a distance of 6 m. In children already prescribed spectacles, visual acuity was tested with glasses. Visual acuity for near vision tested separately for each eye with a Jaeger's near vision chart at a distance of 25 cm. A single experienced optometrist tested visual acuity to avoid interobserver variation, ocular deviation (phoria and tropia) – determined using the cover test.

Fundus examination using direct ophthalmoscopy, students with visual acuity 6/9 or less were further evaluated at the tertiary health care center (Tirunelveli Medical College and Hospital). These students underwent cycloplegic refraction with 1% cyclopentolate eye drops. Streak retinoscopy was performed, and a post-mydratic test was carried out on all students. Children were given a final prescription based on post-mydratic test and subjective acceptance. Amblyopic children were given full refractive correction. Patching was advised and followed up every 3 months.

## RESULTS

The age group distribution was equal in all the groups. The participants were highest in the 10–12 years age group which was 22%. The remaining distribution was 20.8% in 7 years of age, 20.4% in 9 years of age, 19.8% in 8 years of age, and 17% in 6 years of age. The participants were highest in the female, which was 54.8% and 45.2% in males. The participants were highest in V class which was 21.8%. The remaining distribution was 21% in II, 20.4% in IV, 19.8% in III, and 17% in I [Table 1].

The blurring of vision was the most common complaint reported by 40.2% of the study participants. Headache was reported by 30% of the participants. H/O excessive rubbing was found in 18.8% of the study participants, redness was reported by 15.2% of the participants. Other complaints such as eye discharge, swelling of lids, and watering of eyes were found in 11.4%, 6.6%, and 6.8% of the participants. About 15.4% did not report any specific complaints [Table 2].

**Table 1: Sociodemographic profile**

Sociodemographic profile	Frequency	Percentage
Age		
6 years	85	17
7 years	104	20.8
8 years	99	19.8
9 years	102	20.4
10–12 years	110	22
Gender		
Male	226	45.2
Female	274	54.8
Type of class		
1	85	17
2	105	21
3	99	19.8
4	102	20.4
5	109	21.8

**Table 2: Presenting illness**

Presenting illness	Frequency	Percentage
Blurring of vision	201	40.2
Excessive rubbing	94	18.8
Headache	149	30
Watering of eyes	34	6.8
Redness	76	15.2
Eye discharge	57	11.4
Swelling of lids	33	6.6
None	77	15.4

The prevalence of total ocular morbidity among our study participants was 15.4% [Table 3].

Among all reported ocular morbidities, refractive error was the leading cause of ocular morbidity, which formed 66% of the total morbidities. This was followed by blepharitis which accounted for 10.3%, conjunctivitis for 9.3%, sty for 5.2%, and squint 4.1% of total ocular morbidities. Other lesser common conditions such as Vitamin A deficiency, corneal opacity, ocular trauma, ptosis, chronic progressive external ophthalmoplegia, and amblyopia accounted for 1.3% in total ocular morbidity [Table 4].

Fourteen patients had myopia, 21 patients had simple myopic astigmatism, 6 patients had compound myopic astigmatism, 6 patients had simple HM, 1 patient had SHM astigmatism, and 1 patient had mixed astigmatism [Table 5].

## DISCUSSION

The current study is a school-based cross-sectional study to estimate the prevalence of ocular morbidity and the distribution of various associated factors among school children. The number of study participants involved was 500 students. The age of the study participants ranged from 6 to 12 years. In my study, 45.2% (226) were male, and

**Table 3: Prevalence of ocular morbidity**

Ocular morbidity	Frequency	Percentage
Present	77	15.4
Absent	423	84.6

**Table 4: Distribution of type of ocular morbidity**

Ocular morbidity	Frequency	Percentage
Refractive error	49	63.6%
Blepharitis	8	10.3%
Conjunctivitis	7	9%
Stye	4	5.2%
Vitamin A deficiency	1	1.3%
Corneal opacity	1	1.3%
Ocular trauma	1	1.3%
PTOSIS	1	1.3%
Chronic progressive external ophthalmoplegia	1	1.3%
Squint	3	4.1%
Amblyopia	1	1.3%

**Table 5: Distribution of type of refractive error**

Type of refractive error	Frequency	Percentage
Simple myopia	14	28.5
Simple myopic astigmatism	21	43.1
Compound myopic astigmatism	6	12.2
Simple HM	6	12.2
SHM astigmatism	1	2
Mixed astigmatism	1	2

54.8% (274) were female, which is opposed to the survey by Kamath *et al.*<sup>[10]</sup> About 60.77% were male and 39.23% were female. No significant sex preponderance was noted.

In my study, the prevalence of ocular morbidity among children was 15.4%, which is similar to a survey done by Wedner *et al.*<sup>[11]</sup> in rural Tanzania, Africa, with 15.6% of ocular morbidity reported in children aged 7–19 years. The least prevalence of 13% was reported by Prajapati *et al.*<sup>[12]</sup> among adolescents of Gandhinagar district. In contrast, higher prevalence reported by Chaturvedi and Aggarwal<sup>[13]</sup> (more than 40%) in rural Delhi and Kalikivayi *et al.*<sup>[14]</sup> (43.5%) at Hyderabad and prevalence reported by Kumar *et al.*<sup>[15]</sup> (24.6%) from Delhi, Jayanth and Malathi (27.65%) from rural Maharashtra, and Madhu Gupta and others (31.6%) from Shimla.

The prevalence of ocular morbidity varies at different places due to various factors prevailing at other sites. The most typical cause of ocular morbidity in the present study was refractive errors with a prevalence of 63.6%, which is followed by blepharitis which accounted for 10.3%, conjunctivitis for 9.3%, sty for 5.2%, and squint 4.1% of total ocular morbidities, which is similar to a study done by

Dandona *et al.*<sup>[16]</sup> in which 61% had refractive error among children in rural population of India. Prajapati *et al.*<sup>[12]</sup> had observed it as the most common with a prevalence of 40.1% in their study at Gandhinagar. Kalikivayi *et al.*<sup>[14]</sup> have reported a prevalence of refractive error of 32% in a study from South India. Gupta *et al.*<sup>[17]</sup> at Shimla had identified refractive error as the most typical morbidity among children (22%) in their study. Refractive error is one of the most common causes of visual impairment worldwide and the second leading cause of treatable blindness.

In my study, the proportion of refractive error was more in 10 years age group which was 47%. This difference in the distribution of age was statistically significant with  $P < 0.001$ . Age was significantly associated with refractive error. This is similar to a study done by Sun *et al.*<sup>[18]</sup> in China which observed that as the age increases, it was closely associated with increased risk of refractive error in multivariate models. A similar pattern has been noted by Mahapatro *et al.*<sup>[17]</sup> at Bhubaneswar and Goh *et al.*<sup>[19]</sup> in Malaysia. Screening for refractive errors is an integral part of school health problem.

## CONCLUSION

From this study, we concluded that refractive error was the leading cause in our study among all ocular morbidities, contributing 66%, which raises the need for prescription of glasses. Our analysis also correlates the associated factors in children with a positive parental history of refractive error, watching television, playing mobile games for more than 2 h with limited outdoor activities, and more likely to develop visual impairment.

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