

## Research Article

# Prevalence of myopia among school going children

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### ABSTRACT

**Background:** Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of the child. Moreover planning of a youth's career is very much dependent on the visual acuity, especially in jobs for navy, military, railways and aviation. This warrants early detection and treatment of refractive errors to prevent permanent disability. Hence present study was planned with the objective to determine, the prevalence of myopia among school children.

**Methods:** An institution based cross sectional study was carried out among primary and high school children of 7 – 15 years of age. A total of 4429 children were studied over a period of one year. Visual acuity was performed among all children. Myopic children were referred for further evaluation and management. Data was entered in excel and analyzed using proportions and chi square test.

**Results:** The prevalence of myopia was 6%. It was more among girls 155 (58.27%) than boys 111 (41.73%) were boys. 91.73% had bilateral myopia. Visual acuity improved in 95% of cases after correction. Myopia was more common among social class IV compared to social class VI.

**Conclusions:** Early diagnosis and visual rehabilitation of myopic students can be achieved by periodic eye examination at regular intervals by school teachers and basic health workers and this can help in preventing the development of amblyopia thereby reducing the burden of morbidity due to myopia.

**Keywords:** Myopia, Visual acuity, School children

### INTRODUCTION

School myopia occurs at approximately 7-17 years of age and stabilizes by the late teens or early twenties. Over the past few decades, there has been an increase in the prevalence of myopia in some populations, leading to growing concern among the public and the scientific community. There is no well-established or universally accepted treatment for the prevention of myopia onset or progression.<sup>1</sup>

Population based data concerning the prevalence of visual impairment due to uncorrected refractive errors and ocular disease in children are not readily available for india.<sup>2</sup>

97% of all visual disabilities are preventable or treatable. Refractive error is the commonest type of ocular morbidity and myopia is the commonest type of refractive error as opposed to hypermetropia.<sup>3</sup>

School children are considered a high risk group because uncorrected refractive error can seriously affect their learning abilities, physical and mental development.<sup>4</sup>

Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of the child. Moreover planning of a youth's career is very much dependent on the visual acuity, especially in jobs for navy, military, Railways and Aviation. This warrants

early detection and treatment of refractive errors to prevent permanent disability.<sup>5</sup>

The objective of this study was to determine, the prevalence of myopia among school children.

In view of the above facts this kind of school screening cum prevention, promotion and treatment programme seems to be appropriate to reduce ocular morbidity among school children in developing countries.

**METHODS**

This is an institution based (schools) cross sectional study conducted over a period of one year. The primary and high schools in and around the Hubali city of Karnataka were included. All the children between 7-15 yrs. of age in the selected schools were examined for visual impairment.

Sample size was calculated based on the findings of a study from India. Kalikivayi V et al in their study found that prevalence of myopia among school children of south India was 8.6%.<sup>4</sup> As our study settings were also south India, it was decided that we can take the prevalence of myopia as 8.6% for calculation of sample size for the present study. So taking prevalence of myopia as 8.6% with 95% confidence interval and an allowable error of 10%, the sample size came out to be 4251 children. The sample size formula was taken from the statistics text book.<sup>6</sup>

Initially permission from block education officer, Hubali was obtained. Then from the education office, Hubali, we obtained the list of primary and high schools. These listed schools were numbered. List of primary schools and high schools was kept separately. The block education officer, Hubali issued letters to all schools regarding the study to be conducted.

From the total list of primary and high schools in and around Hubali city, 7 primary schools and 3 high schools were selected randomly using simple random sampling technique. From these schools, we covered 4429 school children during the study period after applying following inclusion and exclusion criteria.

**Inclusion criteria:**

School children between 7-15 years of age of either sex in the selected school.

**Exclusion criteria:**

Visual impairment due to

1. Refractive errors other than myopia.
2. Corneal opacities
3. Lens opacities
4. Retinal disease

The purpose and method of examination of students were explained to the head of the school concerned. A large room with plugging system and electricity supply was selected. With the help of concerned physical training teachers and the respective class teachers each class was subjected to visual acuity tests, student by student. The students whose visual acuity was observed to be 6/9 or less was again subjected to visual acuity test. The list of students was given to the class teachers and school head mistress/master. Their parents were informed by the school authority to take the students to outpatient department, Department of ophthalmology, Karnataka Institute of Medical Sciences, Hubali on a particular day. The students were subjected to torch light examination retinoscopy and fundus examination and some students were also subjected to keratometry and A-scan readings. Simple myopes were given the prescription wherever necessary. The condition and prognosis were explained to the parents. Data was recorded and analysed.

According to modified BG Prasad’s classification, children were classified into different social classes.<sup>7</sup>

Data was analysed statistically using proportions and appropriate statistical tests.

**RESULTS**

**Table 1: Prevalence of myopia in different genders.**

Sex	Total no.	No. of Myopics	Prevalence (%)	Chi square (p-value)
Boys	2255	111	4.92	9.55 (p < 0.01)
Girls	2174	155	7.13	
Total	4429	266	6.00	

**Table 2: Visual activity before correction and after correction.**

VA	Before correction	After correction
	No. of eyes (%)	No. of eyes (%)
≤ 6/60	55 (10.33)	2 (0.37)
6/36	42 (7.89)	2 (0.37)
6/24	41 (7.71)	4 (0.75)
6/18	48 (9.02)	6 (1.13)
6/12	129 (24.24)	2 (0.37)
6/9	195 (36.65)	12 (2.25)
6/6	22 (4.13)	504 (94.73)
Total	532	532

The prevalence of myopia was found out to be 6% (266 children) in the present study. Among 266 children 155 (58.27%) were girls and 111 (41.73%) were boys. Thus the prevalence of myopia was found to be more amongst girls than boys.

The visual acuity before correction was randomly distributed. Of the 532 eyes 22 were emmetropic. After optical correction the corrected visual acuity was almost near normal in most of the eyes (504, 94.73%). Only 2(0.37%) eyes had poor distant vision (6/60) even after correction.

**Table 3: Unilateral & bilateral myopia.**

Laterality	No. of cases	Percentage (%)
Unilateral	22	8.27
Bilateral	244	91.73

91.73% students had bilateral myopia. Only 8.27% students had unilateral myopia.

In total of 532 eyes, 481(90.42%) eyes had a refractive error of less than - 3.0 D. 33(6.2%) eyes were between - 3to-6 D myopia and 18 (3.38%) eyes were >-6 D myopia.

**Table 4: Distribution of children as per degree of myopia.**

Degree of myopia	< -3.0D (mild)	-3.0 to 6.0D (moderate)	>-6.0D (high)	Total
No. of eyes	481	33	18	532
(%)	90.42	6.20	3.38	100

**Table 5: Distribution of children as per type of Myopia.**

	UM	SM	SMA	CMA	PM
No.	22	444	22	26	18
%	4.13	83.46	4.13	4.89	3.38

**Table 6: Association between socio-economic classes and myopia.**

Socio-economic class	Prevalence of Myopia
IV – lower middle	147 (55.26%)
V – poor	65 (24.44%)
VI – very poor	54 (20.30%)

Most of the eyes of these students had simple myopia i.e. 444 (83.46%). 22 (4.13%) eyes were emmetropic. Pathological myopia was found in 18 (3.38%) eyes. And simple and compound myopic astigmatism was found in 48 (9.02%) eyes.

Of the 266 cases, lower middle income social class (IV) has myopia prevalence of 147 (55.26%), poor social class (V) has 65 (24.44%) and very poor social class (VI) has 54 (20.30%) prevalence of myopia. There were no children belonging to upper high, high and upper middle classes.

## DISCUSSION

Out of the 4429 students examined 266 students were found to have myopia in at least one eye i.e. 6% of the student had myopia. The prevalence of myopia in girls was found to be more than that of the boys. The prevalence of myopia among girls was 7.13% and 4.92% in boys.

Out of 266 cases, only 22 cases had unilateral myopia, rest of them had bilateral myopia. Going by the type of myopia, most of them had simple myopia i.e. 83.46%. Pathological myopia was found to be 3.38% which is considerable and significant. Rest of the eyes had myopia astigmatism i.e. 9.02% (simple and compound myopic astigmatism).

Going by the degree of myopia, most of the students (90.42%) had myopia of less than - 3.0 D. only 3.38% had myopia of - 6.0 D and above.

Visual acuity after optical correction returned to near normal (6/6 and 6/9) in. 96.98%. Only two eyes had 6/60 of visual acuity even after optical correction. This was probably due to amblyopia.

In the present study, the prevalence of myopia was more among children belonging to lower middle socio-economic status (55.26%) than children belonging to poor class (24.44%) and very poor socio-economic status (Class VI, 20.30%).

### Comparison with different studies

When compared to other studies by different authors with respect to different parameters are shown as follows.

The prevalence of myopia in the above table is almost comparable to our present study especially the Indian origin.

A study done by Chandra DB has shown has shown that the myopia prevalence is more among the children belonging to good socio-economic status and myopia was unilateral in 6% of cases, which are comparable to our present study.<sup>16</sup>

Sperduto RD in his study found that prevalence rates of myopia significantly rose with family income which is also comparable to our present study.

Study by Saw SM shown prevalence of myopia correlated positively with older age, which is also comparable to our present study.<sup>1</sup>

Kalikivayi V studied children between 3-18 years at Hyderabad city, India, and found the prevalence of myopia to be 8.6% and was significantly higher in children ≥ 10 yrs. of age; this was also comparable to our present study.<sup>2</sup>

A study done by Sethi S at Ahmadabad city between 12-17 yrs., has found 25.32% of children were found to be having refractive errors.<sup>18</sup> Of these 47% were females and 53% were males (41.73%). But our study has shown lesser prevalence rate (6%), the reason could be younger age group compared to their study.

Fotouhi A in his study found prevalence of myopia to be higher in middle school children (3.4%) than for high school children (8.5%) than for primary school children (4.9%).<sup>5</sup>

In a study conducted by Wong TY, Loon SC, Saw SM (2006) shows significant proportion of Asian adults have

high myopia, and may therefore be at risk of potentially blinding conditions such as myopic degeneration while the prevalence of high myopia is less than 2% in most western studies.<sup>19</sup> In our present study, the proportion of high myopia is 3.38%, which is slightly higher than western studies.

A study conducted on Greek students between 15-18 yrs. in 1998 by Mavracanas TA et al Showed myopia to be more common in females (46%) than in males (29.7%).<sup>20</sup> Our study also shows myopia prevalence is more for females (7.13%) than for males (4.92%).

**Table 7: Comparison with different studies.**

Study	Country	Sample size	Age(yrs.)	Myopia definition	Cycloplegic refraction	Prevalence (%)
Kalivayal V. <sup>2</sup>	India	4029	3-18	$\leq -0.5D$	No	8.6
Lithander J. <sup>8</sup>	Oman	6292	6 12	$\leq -1.0D$ $\leq -1.0D$	Yes	0.56 5.16
Wedner SH. <sup>3</sup>	Tanzania	2511	11-27	VA<6/12	No	5.6
Fotouhi A. <sup>5</sup>	Iran	5726	7-15	SER $\leq -0.5D$	Yes	3.4
Zhao J. <sup>9</sup>	China	6134	5-15	$\leq -0.5D$	Yes	14.9
Pokharel GP. <sup>10</sup>	Nepal	5526	5-15	$\leq -0.5D$	Yes	0.3
Maul E. <sup>11</sup>	Chile	5303	5-15	$\leq -0.5D$	Yes	5.8
Dandons R. <sup>12</sup>	India (rural)	4074	7-15	$\leq -0.5D$	Yes	4.1
Murthy GV <sup>13</sup>	India (Urban)	6447	5-15	$\leq -0.5D$	Yes	7.4
Naidoo KS. <sup>14</sup>	South Africa	4890	6-18	$\leq -0.25$	Yes	4.0
Lin <sup>15</sup>	Taiwan	11178	6-18	$\leq -0.25$	Yes	12% at 6yrs, 56% at 12yrs
Present study	India	4429	7-15	$\leq -0.25D$	Yes	6.0

## CONCLUSION

Thus an early diagnosis and visual rehabilitation of myopic students can be achieved by periodic eye examination at regular intervals by school teachers and basic health workers and educating them regarding optical correction of myopia thereby preventing the development of amblyopia will definitely reduce the burden of morbidity due to myopia.

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