

PREVALENCE OF MYOPIA IN SCHOOL GOING CHILDREN- A PROSPECTIVE OBSERVATIONAL STUDY IN THE DISTRICT OF CACHAR, ASSAM

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ABSTRACT

Aim: The aim of the present study was to find out awareness about myopia among population of school going students.

Material & methods: The study was a school based cross sectional observational study conducted in selected schools in urban and rural area of district of Cachar in Assam, enrolling a total 250 students in the age group of 6 to 15 years. All the study subjects were clinically examined with torch-light. Visual acuity was measured using Snellen's Chart. Students were placed 6 meters apart from Snellen's Chart and asked to read the chart. From the findings, the students were grouped as myopic and non-myopic. Students who were not having 6/6 vision in at least one eye were primarily considered as myopic.

Results: 28.8% and 30.4% of the children were in the age group of 6-8 years and 9-11 years respectively while 40.8% were in the age group of 12-15 years. Mean age of study subjects was 10.55±2.86 years. Out of 250 children 135 (54.0%) were boys and 115 (46.0%) were girls. Maximum students were in class 9th (n=30; 12.0%) followed by class 5th (n=29; 11.6%). In class 1st and 7th there were 25 students each while in class 2nd, 4th and 8th there were 24 students each. Out of 250 students 134 (53.6%) were from urban area while 116 (46.4%) were from rural area. Family history of refractive error was present in 53 (21.2%) children. Headache was the most common complaint reported by 37 (14.8%) students followed by blurring of vision (28; 11.2%) and occasional pain in eyes (n=27; 10.8%). In our study, prevalence of myopia was 16.4% in students while hypermetropia was seen in 9 (3.6%) subjects and astigmatism was seen in 4 (1.6%) subjects. 10% of the students had mild degree of myopia, 3.6% had moderate and 2.8% had severe myopia. Out of 82 eyes 66 (80.5%) eyes had simple myopia, 4 (4.8%) eyes had simple myopic astigmatism and 2 (3.6%) eyes had compound myopic astigmatism while 4 (4.8%) eyes had pathological myopia.

Conclusion: Simple myopia is more common in school going children. Majority of the cases were detected only during the screening of the students. So, majority of them go unnoticed, making more students visually handicapped. But with the co-operation of the teachers, school authorities and medical staff, affected can be treated with proper optical correction, thereby reducing morbidity due to myopia.

Keywords: myopia, children, prevalence

1. INTRODUCTION

Refraction anomaly is a priority component at global initiative VISION 2020.¹ Refractive error is an optical defect, intrinsic to the eye which prevents light from being brought to a single point focus on the retina, thus reducing normal vision.² Uncorrected refractive errors are the leading cause of avoidable visual impairment in children. Nineteen million children under 15 years old predicted experience a visual disorder, 12 billion of them caused by refraction anomaly that uncorrected which offend children's study development determine career, and the chance of occupation in the future. More than one million of them experience lifetime blindness and need visual rehabilitation.^{1,3,4} Three main types are considered as refractive errors: Hypermetropia - (far-sightedness), myopia (near-sightedness) and astigmatism.^{5,6}

Myopia is a major health issue around the world. The World Health Organization estimates that half of the population of the world may be myopic by 2050.^{7,8} It is the most common refractive error and an important cause of ocular morbidity especially affecting school going children and young adults. Affected by many factors, such as visual function, psychology, aesthetics, and economy, the quality of life in patients of myopia was seriously impaired.⁹ Uncorrected myopia has huge social, economic, psychological and developmental implications. Occur more frequently among school children aged between 8 and 12 years. Because the eye continues to grow during childhood, it typically progresses until about age 20.¹⁰ There is no well-established or universally accepted treatment for the prevention of myopia onset or progression.¹¹

Myopia has been classified as either physiological or pathological. Physiological myopia occurs due to an increase in the axial diameter of the eye over that which is attained by normal growth. It occurs as a result of correlative failure of the refractive components of the normal eye. Pathological myopia is caused by an abnormal lengthening of the eyeball, and is often associated with thinning of the scleral wall.¹² Severe myopia may be associated with myopic macular degeneration, cataract, glaucoma, peripheral retinal changes (such as lattice degeneration), and retinal holes and tears, as well as retinal detachment. Children often do not complain of defective vision and may not even be aware of their problem. They may adjust to poor vision by strategies such as changing position in the classroom, moving objects closer, and tending to avoid tasks that require more visual concentration.¹³ It is recommended to screen children for early detection and intervention to provide them with the best opportunities to learn and develop.¹³

VISION 2020 - the Right to Sight" is a global initiative launched by WHO and IAPB in 1999 to eliminate main causes of avoidable blindness by the year 2020 by giving priorities on cataract, refractive errors, trachoma, onchocerciasis and certain causes of childhood blindness.¹⁴ Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of the child. This warrants early detection and treatment of refractive errors to prevent permanent disability.¹⁵ However, due to the large regional differences in culture, habits, socioeconomic status, educational levels and urbanisation, there continues to be an uncertainty about the exact magnitude of myopia burden in Indian school going children and its trend over time.

Therefore, present study was planned to find out the prevalence of myopia among school going students in the age group of 6 to 15 years and also to know the awareness about myopia among them.

2. MATERIAL & METHODS

The study was a school based cross sectional observational study. The study was carried out in selected schools in urban and rural area of district of Cachar in Assam. Lions Eye Hospital

Silchar being the base hospital over a period of 21 months from October 2019 to June 2021.

INCLUSION CRITERIA:

- All 250 students of both gender aged 6 to 15 years of age studying in class 1st to 10th will be included.

EXCLUSION CRITERIA:

- Systemic illness influencing visual status.
- Traumatic and other complicated myopia.
- Students with any birth defects.
- Students whose parents refuses to give consent.
- Students with any history of previous ocular surgeries.

3. METHODOOGY:

After taking approval from the Scientific Research and Ethics Committee, schools were selected as per sampling criteria. Prior information about the study was provided to the Principals of the selected schools and permission sought from them to conduct the study in their schools.

All the students of the schools under study were included without any discrimination. These students were subjected to the standardized clinical protocol of the hospital which is detailed in Annexure I and II. Parents were also informed 1 week prior about ophthalmological examination. First, the purpose of the study was explained to the students in the local language with the help of the information sheet. After taking written/informed consent, their details were entered in a pretested study proforma that included name, age, sex, and standards (I–X) in which he/she was studying.

A detailed history was taken, and complaints were recorded. Ocular motility was evaluated in all six cardinal positions of gaze and in nine diagnostic positions. All the study subjects were clinically examined with torch-light. Visual acuity was measured using Snellen's Chart. Students were placed 6 meter apart from Snellen's Chart and asked to read the chart. From the findings, the students were grouped as myopic and non myopic. Students who were not having 6/6 vision in at least one eye were primarily considered as myopic. These myopic students brought to the Lions Eye Hospital Silchar, Assam for treatment of refractive error management and follow up. Pin hole vision testing was done to differentiate refractive error from posterior segment pathology. The right eye was tested first and then the left, both with (presenting VA) and without glasses (uncorrected VA [UCVA]). Ishihara's chart was used to detect color blindness. Myopic children who were prescribed to wear glasses; this was followed by contacting their parents to ascertain whether they regularly use the glasses or not. The parents were also counselled to encourage their children for outdoor activities, avoiding digital screens use and reading and studying in proper illumination and not reading at a stress. Awareness regarding proper nutrition were made. Apart from myopia, those children who required special examination process were advised to come to department of ophthalmology, Lions Eye Hospital Silchar, Assam where further evaluation and appropriate treatment was given.

STATISTICAL ANALYSIS:

The collected data were transformed into variables, coded and entered in Microsoft Excel. Data were analyzed and statistically evaluated using SPSS-PC-24 version. Quantitative data was expressed in mean, standard deviation or median with interquartile range and depend on normality distribution, difference between two comparable groups were tested by student's t-test (unpaired) or Mann Whitney 'U' test while for pre-post comparison paired t test or Wilcoxon sign rank test was used. Qualitative data were expressed in percentage and

statistical differences between the proportions were tested by chi square test or Fisher's exact test. 'P' value less than 0.05 was considered statistically significant.

4. RESULTS

Table 1: Demographic data

Age group	No.	%
6-8 years	72	28.8
9-11 years	76	30.4
12-15 years	102	40.8
Gender		
Boys	135	54.0
Girls	115	46.0
Class wise distribution		
1 st	25	10.0
2 nd	24	9.6
3 rd	23	9.2
4 th	24	9.6
5 th	29	11.6
6 th	23	9.2
7 th	25	10.0
8 th	24	9.6
9 th	30	12.0
10 th	23	9.2
Area		
Rural	116	46.4
Urban	134	53.6
Family history of refractive error		
Yes	53	21.2
No	197	78.8

28.8% and 30.4% of the children were in the age group of 6-8 years and 9-11 years respectively while 40.8% were in the age group of 12-15 years. Mean age of study subjects was 10.55 ± 2.86 years. Out of 250 children 135 (54.0%) were boys and 115 (46.0%) were girls. Maximum students were in class 9th (n=30; 12.0%) followed by class 5th (n=29; 11.6%). In class 1st and 7th there were 25 students each while in class 2nd, 4th and 8th there were 24 students each. Out of 250 students 134 (53.6%) were from urban area while 116

(46.4%) were from rural area. Family history of refractive error was present in 53 (21.2%) children.

Table 2: Presenting complaints and Prevalence of refractive error in study subjects

Variables	No.	%
Presenting complaints		
Headache	37	14.8
Watering of eyes	19	7.6
Blurring of vision	28	11.2
Half shutting of the eye gives better vision	15	6.0
Occasional pain in eyes	27	10.8
Redness in eyes	7	2.8
Type of refractive error		
Myopia	41	16.4
Hypermetropia	9	3.6
Astigmatism	4	1.6
Normal	196	78.4

Children were asked regarding symptoms related to eyes. Headache was the most common complaint reported by 37 (14.8%) students followed by blurring of vision (28; 11.2%) and occasional pain in eyes (n=27; 10.8%). Watering of eyes was reported by 19 (7.6%) students while 15 (6.0%) students informed that half shutting of the eye gives better vision. Redness of eyes was also reported by 7 (2.8%) students. In our study, prevalence of myopia was 16.4% in students while hypermetropia was seen in 9 (3.6%) subjects and astigmatism was seen in 4 (1.6%) subjects.

Table 3: Degree of myopia and type of myopia in study subjects

Degree of myopia	No.	%
No myopia	196	78.4
Mild	25	10.0
Moderate	9	3.6
Severe	7	2.8
Type of myopia		
Simple myopia	66	80.5%
Pathological myopia	4	4.8%
Simple myopic astigmatism	4	4.8%
Compound myopic astigmatism	3	3.6%
Emmetropia	5	6.1%

10% of the students had mild degree of myopia, 3.6% had moderate and 2.8% had severe myopia. Out of 82 eyes 66 (80.5%) eyes had simple myopia, 4 (4.8%) eyes had simple myopic astigmatism and 2 (3.6%) eyes had compound myopic astigmatism while 4 (4.8%) eyes had pathological myopia.

Table 4: Prevalence of myopia across different age group

Age group	Myopia		Normal	
	No.	%	No.	%
6-8 years	9	12.5	63	87.5
9-12 years	12	15.8	64	84.2
13-15 years	20	19.6	82	80.4
Gender	Myopia		Normal	
	No.	%	No.	%
Male	18	13.3	117	86.7
Female	23	20.0	92	80.0
Area	Myopia		Normal	
	No.	%	No.	%
Urban	28	20.9	106	79.1
Rural	13	11.2	103	88.8

Prevalence of myopia in 6-8 year age group was 12.5%; in 9-12 years age group was 15.8% while in 13-15 year age group was 19.6% which shows that prevalence was higher with higher age group. Prevalence of myopia in male students was 13.3% while in female students was 20.0% which shows that prevalence of myopia was higher in females compare to males although this association was statistically not significant ($p=0.15$). Prevalence of myopia in urban area was 20.9% while in rural area prevalence was 11.2% which shows that prevalence of myopia was higher in urban area compare to rural area and this difference was statistically significant ($p=0.03$).

Table 5: Awareness about myopia in study subjects

	No.	%
Have you ever heard about myopia		
Yes	196	78.4
No	54	21.6
Methods of correction of low vision		
Spectacles	192	76.8
Surgery	10	4.0
Contact lenses	25	10.0
Don't know	27	10.8

Have you suffered from myopia		
Yes	11	4.4
No	149	59.6
Don't know	90	36.0
What are the causes of myopia		
Malnutrition	147	58.8
Frequent reading	65	26.0
Frequent use of electronic devices	20	8.0
Genetic	31	12.4
Don't know	39	15.6

Out of 250 subjects, 78.4% (n=196) responded that they heard about myopia. Respondents believed that most common reasons for low vision were nutritional deficiency (58.8%) followed by frequent reading (26.0%), genetic(12.4%) and Frequent use of electronic devices (8.0%) while 15.6% participants were not aware about any cause of myopia. Most of the participants were aware about spectacles (76.8%) as a modality to correct low vision. Very few know about surgery (4.0%) and contact lenses (10.0%). 27 (10.8%) participants were not aware about any method of correction of low vision.

5. DISCUSSION

Eyes are the most treasured organs of a human being. Although vision is very important for all ages but it is more so in case of children as it plays a key role in their mental, physical and psychological development.¹⁶ Screening school children is arguably the second largest national programme for control of blindness in India after cataract surgery.¹⁷

In our study, 28.8% and 30.4% of the children were in the age group of 6-8 years and 9-11 years respectively while 40.8% were in the age group of 12-15 years. Mean age of study subjects was 10.55 ± 2.86 years. Out of 250 children 135 (54.0%) were boys and 115 (46.0%) were girls. Demographic finding of our study were in concordance with study by Prabhu AV et al¹⁸, in which mean age of the participants was 10.62 ± 2.72 years within the range of 5–15 years although the distribution of females was found higher (53.58%) as compared to males (46.42%). In study by Tirkey ER et al¹⁹, there were 728 males and 572 females in the study population with an overall male to female ratio of 1.27:1. The age range was 5 years to 10 years. The mean age was 7.5 ± 1.25 years. In present study, family history of refractive error was present in 53 (21.2%) children. In contrast to our study, Prabhu AV et al¹⁸ found family history of refractive error among the siblings was seen among 44.8% of the students from urban schools and 55.2% from rural schools which is very high compared to our study. Vidusha KSS et al²⁰ reported that the family history of refractive errors was present in 226 (19.8%) of the study subjects which is similar to our study.

In our study, children were asked regarding symptoms related to eyes. Headache was the most common complaint reported by 37 (14.8%) students followed by blurring of vision (28; 11.2%) and occasional pain in eyes (n=27; 10.8%). Watering of eyes was reported by 19 (7.6%) students while 15 (6.0%) students informed that half shutting of the eye gives better vision. Redness of eyes was also reported by 7 (2.8%) students. In study by Prabhu AV et al¹⁸, watering was found among 6.7% of the students, followed by blurring for vision or

difficulty in seeing blackboard letters 5.4% and 2.8% from eye strain while doing near activities. Occasional pain and frequent redness of the eyes were also observed in about 2.1% and 1.4% of the students, respectively. In our study, prevalence of myopia was 16.4% in students while hypermetropia was seen in 9 (3.6%) subjects and astigmatism was seen in 4 (1.6%) subjects. Different studies from different part of countries reported prevalence in their region. In study by Prabhu AV et al¹⁸, the prevalence of visual impairment was found to be 4.32% (95% CI: 3.38%, 5.26%) which is very low compare to our study.

In study by Sharma V et al²¹, Refractive error was major cause of visual impairment accounting 32%, amblyopia (7%), squint (7%), followed by other causes like infective eye diseases (18%), conjunctivitis (17%), vitamin A deficiency (13%), and miscellaneous eye disorders (6%). The overall prevalence of refractive errors 12%, amblyopia and squint 2.8% each. Myopia was found in 3.3% and hypermetropia in 9.5% while Pradhan N et al² found prevalence of refractive errors as 7.0% in which myopia was the most common refractive error 43 (61.9%) followed by the astigmatism 17 (24.1%) and hypermetropia 10 (14%) among the children with refractive errors. The increased prevalence of myopia is associated with increasing educational pressure along with life changes, which has led to reduction in the time spent outside by the children. The difference in prevalence of myopia could be due to difference in geographical location wise distribution of the students, different life style pattern and different socioeconomic status of the students.

In our study, prevalence of myopia in 6-8 year age group was 12.5%; in 9-12 year age group was 15.8% while in 13-15 year age group was 19.6% which shows that prevalence was higher with higher age group. Finding of our study were in concordance with Prabhu AV et al¹⁸ in which the prevalence of myopia increased from 1.9% to 5.6% as the age increased from 5 to 15 years, whereas the prevalence of hyperopia decreased from 1.2% to 0.4% as the age increased. The distribution for the presence of either hyperopia or myopia was found to be significantly different across the three different age groups ($P=0.035$). In study by Sharma V et al²¹, higher prevalence of refractive errors in younger age group (5-9 years) was seen because there was high prevalence of age-related hypermetropia (8.5%) in young children. This relation was found to be statistically significant.

In present study, prevalence of myopia in male students was 13.3% while in female students was 20.0% which shows that prevalence of myopia was higher in females compare to males although this association was statistically not significant ($p=0.15$). In study by Vidusha KSS et al²⁰, Among the study subjects with refractive errors 69 (57.5%) of them were females and 51 (42.5%) were males. The association between the refractive errors and gender was not statistically significant. In study by Pradhan N et al², Female students (7.86%) were affected more than males (6.22%). In our study, prevalence of myopia in urban area was 20.9% while in rural area prevalence was 11.2% which shows that prevalence of myopia was higher in urban area compared to rural area and this difference was statistically significant ($p=0.03$). Finding of our study were in concordance with most of the studies. In study by Sheeladevi S et al²², combined refractive error and myopia alone were higher in urban areas compared to rural areas (odds ratio [OR]: 2.27 [CI: 2.09–2.45]) and (OR: 2.12 [CI: 1.79–2.50]), respectively. In meta-analysis by Agarwal D et al^[86], the prevalence of myopia was 8.5% (95% CI, 7.1–9.9%) in urban and 6.1% (95% CI, 4.5–7.7%) in rural children, with highest prevalence in urban 11-15-year age group [15.0% in last decade]. In present study, out of 82 eyes 66 (80.5%) eyes had simple myopia, 4 (4.8%) eyes had simple myopic astigmatism and 2 (3.6%) eyes had compound myopic astigmatism while 4 (4.8%) eyes had pathological myopia. 10% of the students had mild degree of myopia, 3.6% had moderate and 2.8% had severe myopia. Finding of our study were similar to study by Hittalamani SB et al study²³, in which most of them had simple myopia i.e. 83.46%.

In our study, Out of 250 subjects, 78.4% (n=196) responded that they heard about myopia. Respondents believed that most common reasons for low vision were nutritional deficiency (58.8%) followed by frequent reading (26.0%), genetic (12.4%) and frequent use of electronic devices (8.0%) while 15.6% participants were not aware about any cause of myopia. Most of the participants were aware about spectacles (76.8%) as a modality to correct low vision. Very few know about surgery (4.0%) and contact lenses (10.0%). 27 (10.8%) participants were not aware about any method of correction of low vision. Finding of our study were similar to study by Almujailli AA et al[83] who reported that 82% of the students have heard about myopia with the majority source of information being parents (62%) and teachers (35%). 24% of the students suffered from myopia with 57% of students have a family history of myopia. Frequent use of electronic devices (52%) and malnutrition (25%) was the major cause of myopia in student's minds. 20% of students has reported the use of eye-glasses. Most of the students reported uncomfortable feel and shyness due to wearing of eye-glasses which limits their use. 45% of the students reported a negative attitude towards the eye-glasses users. 49% of the students were using electronic devices for less than 2 hours. 11% of the students took regular follow-up for the optics clinic. In the students' view, the limited use of electronic devices and the wearing of eye-glasses will treat myopia

6. CONCLUSION

Observations and results showed that simple myopia is more common in school going children. Majority of the cases were detected only during the screening of the students. So, majority of them go unnoticed, making more students visually handicapped. 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 which will definitely reduce the burden of morbidity due to myopia. Due to high magnitude of uncorrected myopia, it appears to be a public health problem both in urban and rural areas, which suggest that an increase in outdoor activity may help to reduce the magnitude of the problem. There is need that national blindness control program should be integrated with the Sarva Shiksha Abhiyan program and there should be mandatory school vision screening at regular interval in all the schools. Public and school-based health education programs may also be targeted at a very young age. Also, knowledge regarding ocular hygiene in the form of proper reading distance, distance of watching TV and computer use, illumination while reading, and maintaining correct posture while reading should be inculcated in the children right from preschool.

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