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Original Research Article

Prevalence of Myopia and Associated Factors among High School Students in Muzaffarpur District, Bihar, India.

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Abstract:

Objectives: The present study was to evaluate the prevalence of myopia and its associated factors among high school students in Muzaffarpur district, Bihar, India.

Methods: A pre-designed and pre-tested interview schedule was administered to interview the study participants to elicit the information on individual characteristics like sex, standard in which the student is studying, time spent for reading, time of continuous reading, reading distance, reading position, source of light in reading area, mode of spending leisure time, time spent for outdoor activities, duration of sleep and family history of myopia. Visual Acuity was tested using Snellen's chart. Students were placed 6m from the chart and were asked to read the chart. Each eye was tested separately.

Results: A total of 200 students were enrolled for the evaluation of myopia. Mean age of students was 15.62±3.38 years. Among them, 76 students had myopia. Rate of prevalence was 38%. Among 76 myopic students, myopia was greatly seen in girls 44(57.89%) as compared to boys 32(42.11%). Greater number of myopic students 32(51.61%) were seen in age 14-15 years. 20(37.03%) myopic students were seen in age 12-13 years. most of the myopic students 40(52.63%) had Continuously read for more than 30 minutes. Most of the myopic students 37(48.68%) were spent 2-4 hours' time for reading. Majorities of myopic students 39(51.32%) were read less than 30 cm distance. Majorities of myopic students 68(89.47%) were studied in sitting position. Majorities of myopic students 38(50%) were reading 1-2 hours per day. Most of the myopic students 62(81.58%) were not worked on computer.

Conclusions: Myopia is regarded as a major health problem, particularly in the city population, due to increased number of non-corrected refractive defects in school age children. Uncorrected refractive errors cause learning difficulties and poor academic performance, ultimately impacting the child's psychosocial development. Therefore, screening programme should be performed in a school for the detection and evaluation of refractory of school aged children.

Keywords: High School Students, Myopia, Associated Risk Factors.

Introduction

Myopia is a major public health problem in India, particularly among the city population, due to any number of non-corrected refractive defects. Myopia prevalence in the Indian population ranges from 2.77 percent to 7.4 percent [1,2]. According to a World Health Organization (WHO)-NPCB survey conducted in 1989, 1.49 percent of the Indian population is blind, with refractive defects accounting for 7.35 percent [3]. Even though the total prevalence of blindness was lowered to 1.1 percent, the proportion of blindness owing to refractive error grew to 19.7% in the NPCB-National Blindness Survey [4,5]. In rural Indian children, the prevalence of myopia has increased from 4.6% (95% CI, 3.0–6.1) in 1980–2008 to 6.8% (95% CI, 4.2–9.3) in 2009–2019. The percentage increase in myopia prevalence among rural school children was four times compared to their urban counterparts, in the last decade (48% vs 12%) [6].

Myopia is thought to be caused due to increase in the axial (anterior-posterior) length of eye caused by close-up labour, according to several theories. According to studies, certain vocations that involve a lot of close-up work, such as microscopy, stitching, and carpet weaving, have higher

prevalence of myopia. People with myopia, on the other hand, are more likely to favour occupations that require close labour, especially if their vision was not corrected in early years of life [7].

Uncorrected myopia has significant social, economic, psycho logical and developmental implications [8]. Also, ineffective preventive methods warrant identifying modifiable risk factors [9, 10]. However, due to differences in cultures, habits, socio economic status, educational levels and urbanisation, there remains uncertainty about the exact burden of myopia in rural Indian school-going children and their risk factors. The rise in the number of myopic people in advancing age group can be related to the rise in near tasks like computer work, video games, and watching television [11]. Objectives of our study was to evaluate the prevalence of myopia and its associated factors among high school students in Muzaffarpur district, Bihar, India.

Material & Methods

The present study was conducted in the Department of Ophthalmology, Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar during a period from July 2023 to September 2023.

A total of 200 students were selected by applying the simple random sampling methods. The same number of students from each class 50 students were selected by fixing same number of girls and boys from each class. Using the roll book, students from each class were selected by applying simple random sampling techniques.

A pre-designed and pre-tested interview schedule was administered to interview the study participants to elicit the information on individual characteristics like sex, standard in which the student is studying, time spent for reading, time of continuous reading, reading distance, reading position, source of light in reading area, mode of spending leisure time, time spent for outdoor activities, duration of sleep and family history of Myopia. The questions were asked in local language, that is, that was understood by all the students and the answers were recorded in English.

Visual Acuity was tested using Snellen's chart. Students were placed 6m from the chart and were asked to read the chart. Each eye was tested separately. The definition of Myopia used in the study was - those who were having distant visual acuity less than 6/6 were considered as myopic [12].

Statistical Analysis

Data was analysed by using simple statistical methods with the help of MS-Office software. All data was tabulated and percentages were calculated.

Results

A total of 200 students were enrolled for the evaluation of myopia. Among them, 76 students had myopia. Mean age of students was 15.62±3.38 years. Rate of prevalence was 38%. Among 76 myopic students, myopia was greatly seen in girls 44(57.89%) as compared to boys 32(42.11%).

Table.1. Prevalence of myopia according to gender.

Gender	No. of students	Percentage
Boys	32	42.11%
Girls	44	57.89%
Total	76	100%

In the present study, a greater number of myopic students 32(51.61%) were seen in age 14-15 years. 20(37.03%) myopic students were seen in age 12-13 years.

Table.2. Prevalence of myopia.

Age (Years)	No. of students	Prevalence of myopia
12-13	54	20(37.03%)
14-15	62	32(51.61%)
16-17	43	16(37.21%)
18-19	41	08(19.51%)
Total	200	76(38%)

In the present study, most of the myopic students 40(52.63%) had Continuously read for more than 30 minutes. Most of the myopic students 37(48.68%) were spent 2-4 hours' time for reading. Majorities of myopic students 39(51.32%) were read less than 30 cm distance. Majorities of myopic students 68(89.47%) were studied in sitting position. Majorities of myopic students 38(50%) were reading 1-2 hours per day. Most of the myopic students 62(81.58%) were not worked on computer. Majorities of myopic students 69(90.79%) were watched television at distance greater than 30 cm. Most of the myopic students 47(61.84%) were studied on bright light. Majorities of myopic students 35(46.05%) were slept for the duration of 7-8 hours. In myopic students, myopia was seen in most of the students with siblings 44(57.89%), history of myopia in father

39(51.32%) and history of myopia in mother 41(53.94%).

Table.3. Associated risk factors of myopia.

Variables	Myopic (N=76)	Non myopic (N=124)
Continuously read for more than 30 minutes		
Yes	40(52.63%)	70(56.45%)
No	36(47.37%)	54(43.55%)
Total time spend for reading		
< 2hrs	33(43.42%)	72(58.06%)
2-4 hrs	37(48.68%)	42(33.87%)
4-7 hrs	5(6.56%)	9(7.26%)
>7 hrs	1(1.32%)	1(0.81%)
Reading distance		
Less than 30 cm	39(51.32%)	58(46.77%)
Greater than 30 cm	37(48.68%)	66(53.23%)
Reading position		
Lying	6(7.89%)	12(9.67%)
Sitting	68(89.47%)	111(89.52%)
Walking	2(2.63%)	1(0.81%)
Reading hours per day		
< 1 hour	20(26.32%)	18(14.52%)
1-2 hour	38(50%)	27(21.77%)
>3 hours	08(10.53%)	10(8.06%)
Nil	10(13.16%)	21(16.93%)
Computer hours per weekend		
2-3 hours	9(11.84%)	6(4.84%)
3-4 hours	5(6.58%)	2(1.61%)
>4 hours	0	1(0.81%)
Nil	62(81.58%)	115(92.74%)
Distance while watching TV		
Less than 30 cm	04(5.26%)	9(7.26%)
More than30 cm	69(90.79%)	104(83.87%)
Nil	03(3.94%)	11(8.87%)
Illumination while reading		
Dim	18(23.68%)	13(10.48%)
Bright	47(61.84%)	42(33.87%)
Nil	11(14.47%)	21(16.93%)
Duration of Sleep		
Less than 6 hours	4(5.26%)	09(7.26%)
6-7 hours	16(21.05%)	39(31.45%)
7-8 hours	35(46.05%)	52(41.94%)
Greater than 8 hours	21(27.63%)	24(19.35%)
Family history of myopia in siblings		
Yes	44(57.89%)	38(30.64%)
No	32(42.11%)	86(69.35%)
Family history of myopia in father		
Yes	39(51.32%)	52(41.94%)
No	37(48.68%)	72(58.06%)
Family history of myopia in mother		
Yes	41(53.94%)	55(44.35%)
No	35(46.05%)	69(55.65%)

Discussions

Myopia is an increasingly serious health problem in the world. By 2050, the prevalence of myopia in the global population will be as high as 49.8% [13]. Preventing myopia and its associated pathologies is challenging, although the ability to prospectively identify individuals at greatest risk could help to determine the affected individuals and their possible treatments. A total of 200 high school children were enrolled in the present study. Among them, prevalence of myopia was 38%. The prevalence of myopia has been shown to vary

widely with geographic location according to previous studies. The prevalence of myopia was 6.0% in 6–8 years old children and 28.9% in 11–13 years old children in Canada [14], 14.8% and 59.0% in 5–7 and 17–19 years old children, respectively, in USA [15], and 13.3% in 3–17 years old children in Germany [16]. The prevalence of myopia in children was 20% in Spain [17], 13% in Norwegian adolescents [18], and 21.1% in North India [19]. Compared with other countries in the world, East Asia has significantly higher prevalence of myopia, reaching 81.2% in age group 16–18 years in China [20], 76.5% among the elementary school students and 94.9% among the junior high school students in Japan [21], and 64.6% in Korea [22].

In the present study, prevalence of myopia was greater in age 14-15 years school children. In a study in Southern India, [23] prevalence of myopia was significantly higher among children 10 years of age and above. The quoted study was also done in South India among school children. In another study in Hong Kong, [24] prevalence of myopia among school children was correlated positively with older age, with highest risk in children aged 11 years (OR=2.27). In other studies, [27, 25, 26] increasing age was associated with the increased risk of having myopia among school children. As seen from studies, [25] done in Ejina, China; Beijing, [26] India, [27, 23] and Hong Kong, [24] it is clear that irrespective of race, ethnicity and region, the prevalence of myopia is strongly associated with increasing age.

In the present study, prevalence of myopia was greater in girls 57.89% than boys. In a study from Kashmir, [27] it was seen that girl students had more risk of myopia than boys (OR= 1.52). It was due to the fact that girls usually restricted their activities to inside the house and the outdoor activities like games, jogging etc were mainly undertaken by the boys.

The students who spent 2-4 hours and more than 4 hours for reading in a day were found to be more myopic than those who spent lesser hours reading.

Another study, [28] showed a positive association between presence of myopia and the students who study or read for more than 5 hours per day. The quoted study was done in an urban school in Delhi and Delhi being the epicentre of education, more competitive studies exist among students and hence the students there may be more hardworking than those residing in rural areas, where students might not spend most of their time reading.

Family history of myopia in first- and second-degree relatives was not associated with Myopia in the present study. In a study done by Rohit Saxena, [28] a positive association of myopia with family history was found. In another study, [29] it was found that the risk of myopia increased in those children who had a family history.

Parental history was found to be associated with the formation of myopia already in 1989 [30]. Studies in different countries have reached a common conclusion that parental history is the most important factor associated with myopia [31, 32] and children with myopic parents have a higher risk of myopia. The highest OR was found in Nigeria, where people with one myopic par ent had 5.80% (95% CI: 2.76–16.74) higher risk of developing myopia than those with none myopic parent, and risk for those with two myopic parents was 8.47% (95% CI: 3.88–23.13) higher [33]. Parental myopia was also significantly associated with high myopia [34].

In the present study, continuously reading for more than 30 minutes and the reading distance less than 30cm were not significantly associated with myopia . In a study, [29] done among urban female school students in Surat, close reading at a distance less than 30 cm and continuous reading for more than 30 minutes and in low illumination adds upon the progression of myopia.

In another study, [35] done in Australia, it was seen that near work such as close reading distance less than 30 cm and continuous reading for more than 30 minutes independently increased the odds of having myopia.

In the present study, reading habit as such may not be very pronounced for the students, whereas the quoted study was done in a developed country where the students may have the habit of reading for pleasure. Hours spent for reading during weekends was found to be the significant risk factor for myopia in the present study. Those who spend more than 3 hours for reading were at a greater risk of developing myopia.

Duration of sleep per day was associated with the occurrence of myopia in the present study. Those who slept for more than 8 hours per day were at a greater risk of developing myopia. In a study by Yanong Gong, [36] significant association between myopia and hours of sleeping were found.

Higher prevalence of myopia in urban population was also noted in other study from India. Dandona et al. [37] in Andra Pradesh Eye Diseases Study (AEPDS) also noted that urban location was a predictor of myopia, and children of urban area had 2.5 times higher risk compared to rural children.

Environmental factors such as progressively more competitive education system may have had an increasing impact in recent years. Moreover, environmental factors such as educational level, occupation and individual income have been shown to associate with the prevalence of myopia [38, 39].

There is need that National blindness control programme should be integrated with the Serve Shiksha Abhyaan (SSA) programme and there should be mandatory school vision screening at regular interval in all the schools. Large-scale visual acuity screening programs must be launched to detect low vision due to myopia early and an annual check up to update the spectacle prescriptions. Public and school-based health education programs may also be targeted at the very young age. School teacher should be involved for positive reinforcement of school children for screening.

Conclusions

The present study concluded that the myopia is regarded as a major health problem, particularly in the city population, due to increased number of non-corrected refractive defects in school age children. Uncorrected refractive errors cause learning difficulties and poor academic performance, ultimately impacting the child's psychosocial development. Therefore, screening programme should be performed in a school for the detection and evaluation of refractory of school aged children.

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