

The prevalence of myopia among school students in urban area Bangladesh and to explore the associations between reading and writing postures and myopia

ABSTRACT:

Background: Myopia, or near-sightedness, is a common vision problem that normally manifests itself between the ages of 6 and 14. Just around 5% of toddlers, 9% of elementary pupils, and 30% of high schoolers are impacted. Myopia is more common in children of parents with nearsightedness.

Objective: To assess the prevalence of myopia among school students in urban area Bangladesh and to explore the associations between reading and writing postures and myopia.

Methodology: Participants were selected from January 2019 through January 2020 using a complex, stratified, multistage sample design. At least half as many students from each grade level in elementary, middle, and high school participated in the research, and one urban and one rural district in Bangladesh were selected using a random number generator. In all, we had 150 participants, 50 elementary school students, 50 middle schoolers, and 50 high schoolers.

Results: The patients' average age was 10.50 0.86 years throughout the research. The median age of the next cohort, those in middle school, was 14.090.92 years; the median age of the next cohort, those in high school, was 16.550.89 years. And the overwhelming majority was male. Three-fifths of first graders had a chest bulge larger than a fist, according to a study. In the group of students in middle school, the figure was 25%, and in the group of students in high school, it was 27%. In addition, 60% of the patients came from metropolitan areas and 40% came from rural areas. In addition, 26% of students in elementary school, 30% in middle school, and 31% in high school said that their eyes were typically more than 33 cm (one Chi) from the page when reading. We found that a reading distance >33 cm is a protective factor for myopia in female students in elementary school (OR = 0.55, 95% CI = 0.30-0.99) and in middle school (OR = 0.37, 95% CI = 0.15-0.90) when examining the correlations between reading and writing postures and myopia.

Conclusion: Our findings suggest that urban populations are disproportionately affected by myopia. Myopia may be prevented and managed with the use of a reading distance of more than

33 centimeters. There may be scholastic and societal gains to be had by requiring correct postural measurements for reading and writing.

Keywords: reading and writing posture, myopia, school students

INTRODUCTION

In the last several decades, myopia in kids and teens has become a major problem (1). Myopia in children and teenagers is impacted by a number of factors outside genetics (2), including the amount of near work done (4), height (5), body mass index (6), urbanization (7), and time spent outdoors (8). (7).

Environmental factors are being studied and manipulated in an effort to reduce myopia. The near-sighted habits that contribute to slouched reading and writing positions are one of the primary areas of focus for correction (8). According to the "one Chi, one fist, and one Cun" principle (where "one Chi" is 33 centimeters, "one Cun" is 3.3 centimeters, and "one fist" is the width of a fist), a child's eyes should be about 33 centimeters from a book, a child's chest should be about the width of a fist from a desk, and a child's elbow should be about the In developing countries like Bangladesh, the "three ones" concept is the foundation for nearly all standards for reading and writing postures. There were a few studies that didn't apply any of the above criteria at all, while others expanded on them (9).

Standard reading distance is 30–33 cm, which is measured from the center of the reader's forehead to the center of the page. Researches also often utilize metrics such as reading and writing distance, short-distance reading time, whether or not the body is sitting upright, and the presence or absence of forward or backward skew.

OBJECTIVE

The goals of this study were (1) to determine how common myopia is among school-aged children in metropolitan areas of Bangladesh and (2) to investigate whether or not there is a correlation between students' reading and writing postures and myopia.

METHODOLOGY

A cross-sectional study of the Bangladeshi population was conducted between January 2019 and January 2020, and it found a correlation between myopia and slouching during reading and writing.

Participants were selected using a complex, stratified, multistage sample design. One urban area and one rural area in Bangladesh were selected at random, and from each area, seven schools were chosen: two elementary schools, two middle schools, two high schools, and one vocational high school in the urban area, and five schools, two elementary schools, two middle schools, and one high school, were chosen in the rural area.

At least 50 students across all grade levels (primary, intermediate, and secondary) took part in the research. We included a total of 150 students from three different educational levels in our analysis (elementary school (n=50), middle school (n=50), and high school (n=50)).

RESULTS

Table-1 displays the patients' demographic information, including their mean age (10.500.86) in the primary school age group. The next age group, those in middle school, had a mean age of 14.090.92 years, while those in high school had a mean age of 16.550.89.

Table-1: Demographic status of the patients

Mean	Age	Primary school	Middle school	High School
Distribution		10.50± 0.86	14.09 ± 0.92	16.55 ± 0.89

Figure-1 shows gender distribution where in all group majority were male.

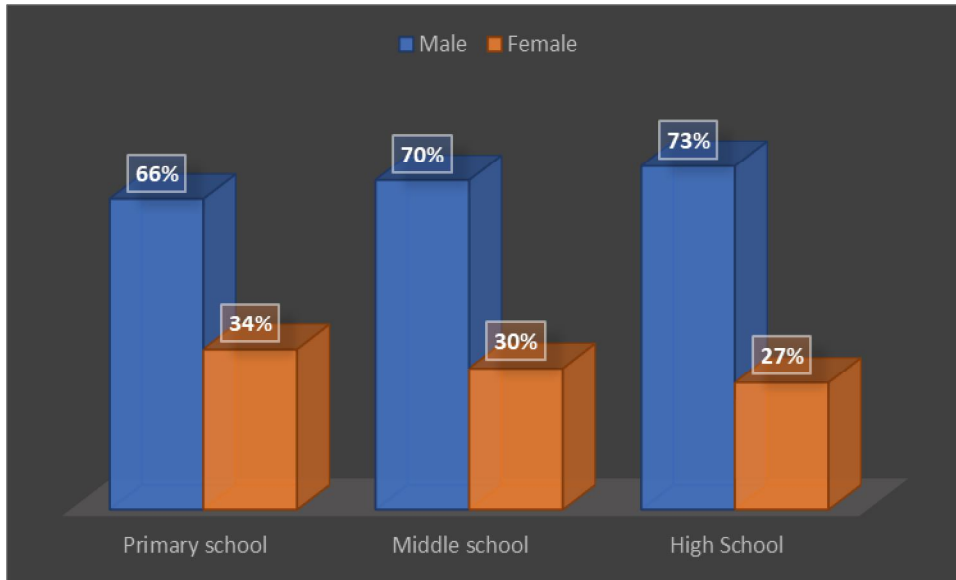


Figure-1: Gender distribution

Statistics on the prevalence of myopia by sex are shown in Figure-2. Myopia was shown to affect 55% of male and 66% of female elementary school pupils. Myopia was found to affect 77% of male and 78% of female middle school pupils. High school pupils showed a frequency of myopia of 79% among male students and 82% among female students.

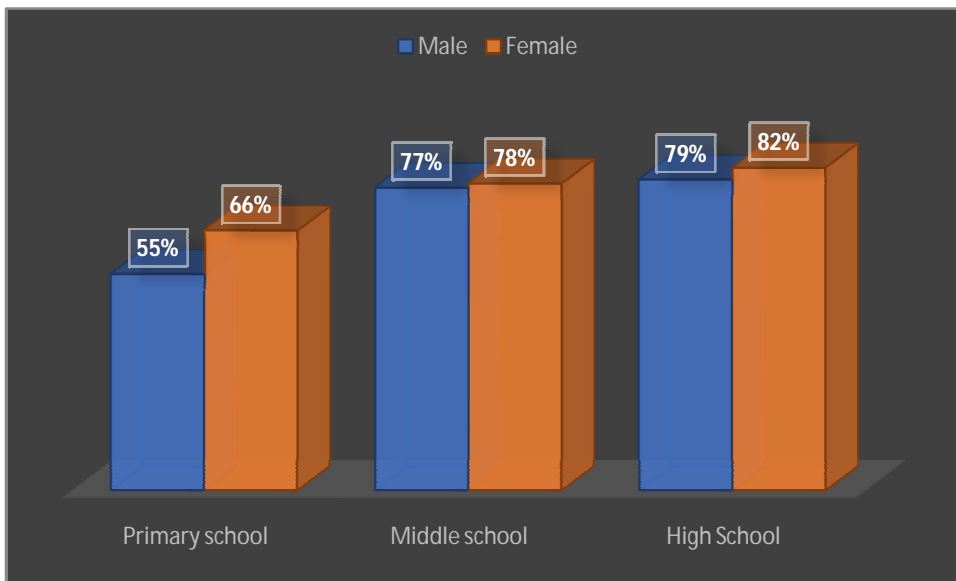


Figure-2: Myopia prevalence according to gender

Figure-3 shows myopia prevalence according to residential area where 60% were from urban.

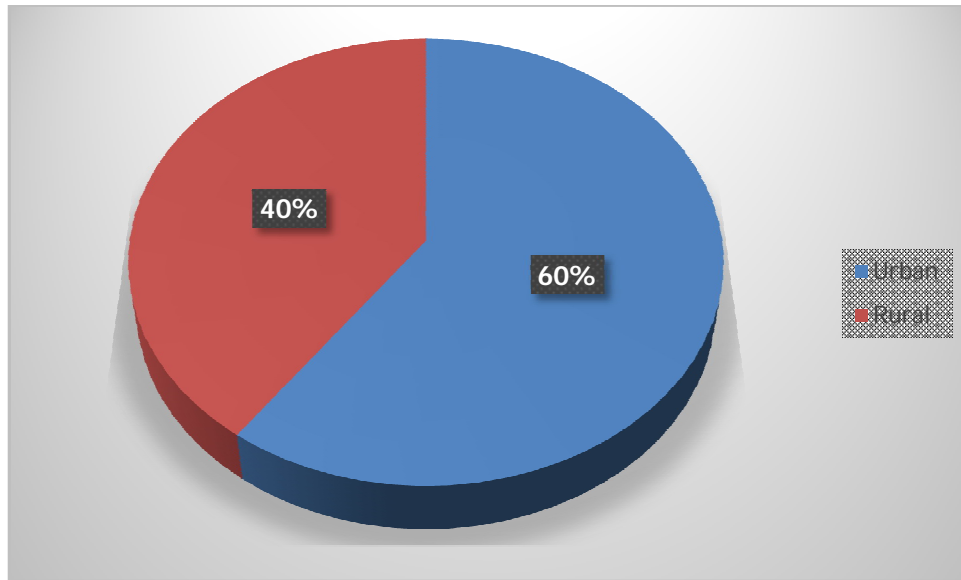


Figure-3: Myopia prevalence according to residential area

In Table 2, we see that 35 percent of patients in the elementary school age range reported having chest pains that required them to move their hand further away from their sides. After that, the percentage was 25% among the middle schoolers, 27% among the high schoolers. In addition, 26% of elementary school students, 30% of middle school students, and 31% of high school students had eyes that are typically more than 33 cm (one Chi) away from the text while reading.

Table-2: clinical history of the patients

The chest is more than the width of a fist from the edge of the table	Primary school	Middle school	High School
Never	19%	15%	17%
Sometimes	21%	35%	36%
Usually	25%	25%	27%
Always	35%	25%	20%

The eyes are more than 33 cm (one Chi) away from the book			
Never	11%	12%	13%
Sometimes	39%	40%	42%
Usually	26%	30%	31%
Always	24%	18%	14%
The finger is about 3.3 cm (one Cun) away from the tip of the nose			
Never	12%	13%	14%
Sometimes	43%	40%	40%
Usually	29%	33%	34%
Always	14%	14%	12%
Does your teacher remind you that your reading and writing posture is not correct?			
Never	13%	12%	12%
Sometimes	45%	45%	43%
Usually	27%	27%	27%
Always	15%	14%	16%
Do your parents remind you that your reading and writing posture is not correct?			

Never	12%	12%	12%
Sometimes	44%	42%	43%
Usually	28%	30%	30%
Always	14%	14%	13%

Reading at a distance of more than 33 centimeters was shown to be protective against myopia in female students after controlling for age and grade (see Table 3 of Logistic regression of myopia-related variables by gender). Myopia is less likely to develop in kids if they regularly read at distances further than 33 centimeters. If we compare female students who answered "never" to those who answered "sometimes," "usually," and "always," the odds ratio (OR) for "the eyes are more than 33 cm away from the book" was 0.52 (95% CI: 0.28-0.97), 0.49 (95% CI: 0.25-0.96), and 0.31 (95% CI: 0.15-0.64), respectively. Research has also shown that maintaining a finger's distance from the tip of the nose (around 3.3 centimeters) is safe for male college students. For the statement, "the finger is roughly 3.3 cm away from the tip of the nose," the OR and 95% CI for subjects who picked "sometimes" were 0.61 and 0.02, respectively, in comparison with male students who chose "never" (0.39, 0.96). One of the risk factors for myopia amongst female students was sitting with their chests more than a fist's breadth from the edge of the table [usually: 1.89 (1.03, 3.49), always: 2.01 (1.04, 3.88)]. Myopia risk increased in both male and female pupils when they were constantly advised by their parents to maintain healthy reading and writing postures.

Table-3: Logistic regression of myopia-related factors by gender

Myopia-related factors	Male		Female	
	OR (95% CI)	P value	OR (95% CI)	P value
Age	1.20 (1.06, 1.38)	0.006	1.26(1.09, 1.48)	0.002
The chest is more than the width of a fist from the edge of the table	Male		Female	
	Male		Female	
	OR (95% CI)	P value	OR (95% CI)	P value

Sometimes	1.27 (0.78, 2.07)	0.334	1.30 (0.73, 2.32)	0.373
Usually	1.27 (0.76, 2.13)	0.359	1.89 (1.03, 3.49)	0.041
Always	1.16 (0.67, 1.99)	0.598	2.01 (1.04, 3.88)	0.039
The eyes are more than 33 cm (one Chi) away from the book	Male		Female	
	OR (95% CI)	P value	OR (95% CI)	P value
Sometimes	1.51 (0.92, 2.49)	0.103	0.52 (0.28, 0.97)	0.041
Usually	1.49 (0.86, 2.58)	0.152	0.49 (0.25, 0.96)	0.036
Always	0.93 (0.52, 1.64)	0.790	0.31 (0.15, 0.64)	0.001
The finger is about 3.3 cm (one Cun) away from the tip of the nose	Male		Female	
	OR (95% CI)	P value	OR (95% CI)	P value
Sometimes	0.61 (0.39, 0.96)	0.033	1.01 (0.62, 1.65)	(0.62, 1.65)
Usually	0.78 (0.49, 1.25)	0.303	0.67 (0.41, 1.09)	0.110
Always	0.87 (0.55, 1.37)	0.550	0.93 (0.57, 1.49)	0.748
Does your teacher remind you that your reading and writing posture is not correct?	Male		Female	
	OR (95% CI)	P value	OR (95% CI)	P value
Sometimes	1.03 (0.71, 1.50)	0.882	1.01 (0.68, 1.51)	0.959
Usually	0.81 (0.52, 1.27)	0.353	0.84 (0.52, 1.36)	0.478
Always	0.62 (0.37, 1.03)	0.064	0.92 (0.54, 1.57)	0.757
Do your parents remind you that your reading and	Male		Female	
	OR (95% CI)	P value	OR (95% CI)	P value

writing posture is not correct?				
Sometimes	1.11 (0.70, 1.74)	0.666	0.666	1.43 (0.84, 2.44)
Usually	1.22 (0.74, 2.00)	0.440	2.03 (1.14, 3.61)	0.016
Always	2.22 (1.28, 3.87)	0.005	1.90 (1.05, 3.45)	0.034

Logistic regression of myopia risk variables by educational setting is shown in Table 4. Myopia risk was reduced in both elementary [always: 0.55 [0.30, 0.99]] and junior high [always: 0.37 [0.15, 0.90]] school pupils who read at distances of greater than 33 cm after controlling for gender and age. The OR and 95% CI for subjects who answered "sometimes" was 0.41 compared to middle school students who chose "never" for "the finger is approximately 3.3 cm away from the tip of the nose" (0.21, 0.79). Nonetheless, middle schoolers who sit with their chests closer to the edge of the table than the width of a fist are at danger, and parents who remind their children about proper reading and writing postures are also at risk among elementary schoolers.

Table-4: Logistic regression of myopia-related factors by school type

Myopia-related factors	Primary school		Middle school		High School	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Age	1.55 (1.33, 1.80)	<0.001	1.15 (0.97, 1.38)	0.111	0.82 (0.65, 1.03)	0.083
The chest is more than the width of a fist from the edge of the table	Primary school		Middle school		High School	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Never						

Sometimes	1.25 (0.76, 2.05)	0.376	1.93 (0.95, 3.94)	0.070	0.50 (0.17, 1.47)	0.206
Usually	1.54 (0.91, 2.60)	0.107	3.60 (1.66, 7.80)	0.001	0.37 (0.12, 1.09)	0.072
Always	1.70 (0.97, 3.00)	0.065	2.79 (1.25, 6.26)	0.013	0.33 (0.11, 1.02)	0.054
The eyes are more than 33 cm (one Chi) away from the book	Primary school		Middle school		High school	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Never	-	-	-	-	-	-
Sometimes	0.78 (0.46, 1.30)	0.339	1.02 (0.47, 2.20)	0.970	1.86 (0.81, 4.26)	0.143
Usually	0.97 (0.55, 1.71)	0.913	0.58 (0.25, 1.31)	0.187	1.80 (0.74, 4.40)	0.198
Always	0.55 (0.30, 0.99)	0.046	0.37 (0.15, 0.90)	0.028	1.17 (0.43, 3.22)	0.762
The finger is about 3.3 cm (one Cun) away from the tip of the nose	Primary school		Middle school		High school	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Never	-	-	-	-	-	-
Sometimes	1.00 (0.63, 1.60)	0.996	0.41 (0.21, 0.79)	0.008	0.86 (0.42, 1.75)	0.666

Usually	0.72 (0.45, 1.16)	0.181	0.63 (0.32, 1.25)	0.187	0.79 (0.38, 1.67)	0.536
Always	0.96 (0.61, 1.51)	0.858	0.66 (0.34, 1.29)	0.225	1.23 (0.59, 2.58)	0.578
Does your teacher remind you that your reading and writing posture is not correct?	Primary school		Middle school		High school	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Never	-	-	-	-	-	-
Sometimes	0.93 (0.60, 1.42)	0.731	1.03 (0.62, 1.71)	0.921	1.15 (0.68, 1.94)	0.599
Usually	0.89 (0.54, 1.44)	0.625	0.86 (0.47, 1.58)	0.634	0.55 (0.28, 1.09)	0.085
Always	0.73 (0.44, 1.22)	0.231	0.93 (0.47, 1.82)	0.820	0.65 (0.20, 2.08)	0.464
Do your parents remind you that your reading and writing posture is not correct?	Primary school		Middle school		High school	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value

Never	-	-	-	-	-	-
Sometimes	1.31 (0.76, 2.24)	0.328	1.34 (0.71, 2.51)	0.369	0.91 (0.46, 1.76)	0.770
Usually	1.56 (0.87, 2.80)	0.137	1.39 (0.71, 2.72)	0.343	1.52 (0.72, 3.18)	0.271
Always	1.96 (1.07, 3.57)	0.029	1.91 (0.93, 3.92)	0.077	2.49 (0.88, 7.08)	0.087

DISCUSSION

The frequency of myopia among school-aged children in Bangladesh revealed in our research was consistent with that seen in other parts and cities of the district.

Throughout six provinces in China, 55.7% of primary and secondary school pupils were found to have myopia. The rates were as follows: lowest (6-8 year olds; 35.8%), highest (10-12 year olds; 58.9%), lowest (13-15 year olds; 81.2%), and highest (16-18 year olds; 81.2%). (13).

Our schoolchildren had a much higher incidence of myopia than those from other countries.

Among the 1,626 participants in the Ireland Eye Study, the prevalence of myopia was 3.3% in the 6-7 year old age group and 19.9% in the 12-13 year old age group (14).

Just 23.4% of first-year Portuguese college students had myopia, according to Jorge et al (15).

One's posture while reading or writing may impact their retinal image quality, the amount of convergence and adaptation required, and their binocular comfort, all of which can have an impact on how much they enjoy the activity (16).

Some studies postulated as a consequence that the posture we adopt when reading and writing could have an important role in the development of myopia (17).

Myopia Research Study in Taipei followed 10,743 children between the ages of 9 and 11 for two years (18).

After adjusting for gender and high parental myopia, students whose working distance was less than 30 centimeters who also took short breaks every 30 minutes showed significantly less myopic progression.

These traits are independent risk factors since their importance remained when other factors were taken into account.

Ip et al. (12) found a similar correlation between happiness and the amount of time spent reading for pleasure and the proximity of the reader to the text.

Students who read with their eyes 33 centimeters or more from the page and whose fingers are more than 3.3 centimeters from the tip of their nose were less likely to acquire myopia, according to our study. The findings of our study were consistent with those of other studies.

Research conducted by Bao et al. on 120 myopic children aged 6-13 years old revealed a significant reduction in working distance as a result of prolonged use of reading and writing activities ($p < 0.001$). (19).

The researchers at Wu et al. looked at data from 4,677 students between the ages of 16 and 18 and discovered that myopia was associated with an increase in close work time (OR = 1.43, 95% CI: 1.06-1.93) and a reduction in near work distance (OR = 1.87, 95% CI: 1.55-2.26). (20).

Better ergonomics and text design may assist decrease myopia and enhance reading abilities among kids, although reading behavior is not consistent but varies by grade and reading contexts (21).

Children whose chests were closer than a fist's length to the edge of the table were more likely to develop myopia, and their parents were more likely to be reminded of correct reading and writing postures.

Having a kid with myopia at school may cause parents to pay more attention to their child's reading and writing posture and inspire them to set more reminders, which might contribute to prevalence-incidence bias.

While the findings for the chest-to-table distance remained paradoxical, we will think about further refining the questionnaires and testing them in a broader population sample. This is due to the fact that schoolchildren may have misinterpreted the inquiry, or because kids' reading and

writing postures may have to be adjusted in different ways if they are to keep their chests at the same distance from the table while they work.

CONCLUSION

We did not account for all the elements that lead to nearsightedness in this article; rather, we concentrated on the connections between myopia and reading and writing postures.

Conclusion: Myopia is more common in those who live in urban areas, and a good reading distance (>33 cm) may help prevent and manage this condition.

Consent

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

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