International Journal of Research in Medical Sciences
Tima FT et al. Int J Res Med Sci. 2026 Aug;14(8):xxx-xxx
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20262330

Original Research Article

Association between smart device use and change in myopia in the OPD of a tertiary eye hospital

Faria Tilat Tima[1]*, Tanjima Yeasmin Liza[2], Shirin Ara Alam[1], Kamrun Nahar Mukta[1], Tarzia Asma Zafullah[3], Sabrina Nabi Shorna[1], Salahuddin Ahmed[1], Major Tanvir Ahmed[4]

[1]Department of Ophthalmology, Dhaka Medical College Hospital, Dhaka, Bangladesh
[2]Department of Ophthalmology, Cumilla Medical College, Cumilla, Bangladesh
[3]Department of Ophthalmology, Lions Eye Hospital, Dhaka, Bangladesh
[4]Department of Ophthalmology, Border Guard Hospital, BGB, Dhaka, Bangladesh

Received: 09 June 2026
Accepted: 29 June 2026

***Correspondence:**
Dr. Faria Tilat Tima,
E-mail: tilattima7@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Nowadays, children and adolescents are exposed to digital media from an early age. More and more aspects of modern life are thought to be affected by excessive screen time. Accordingly, the aim of this review is to document the effects of excessive screen time viewing on children and adolescents and change in myopia. A narrative review was performed in searchable databases.
Methods: Ninety-three patients will be included in the study after the patient/ ensuring written, informed consent from their legal guardians. All will undergo ophthalmological examination and data will be collected in a data record form. SPSS version 23 will be used for data analysis.
Results: The majority of participants were aged 11-15 years (34.4%), male (52.7%), and from urban areas (73.1%). Smartphones were the most commonly used device (61.3%). About 57.0% of participants reported screen time exceeding three hours per day. Mild myopia was observed in 44.1% of cases, moderate myopia in 36.6%, and severe myopia in 19.3%. A statistically significant association was found between increased daily screen time and higher severity of myopia (p<0.001).
Conclusions: Prolonged smart device use is significantly associated with increased severity of myopia, highlighting the need for preventive strategies to limit excessive screen exposure, especially among children and adolescents.

Keywords: Smart device use, Myopia progression, Screen time, Refractive error, Pediatric eye health

INTRODUCTION

Children and adolescents grow up in a society where modern technology has become a crucial part of their daily lives. As a result, they are exposed to electronic devices from an early age and consequently to Screen time (ST) viewing. This systematic review provides some studies that indicate that the use of digital screens may be correlated with myopia progression. Latest researchers have discovered that excessive use of screen devices was associated with increasing myopia prevalence, particularly when using devices for more than 3 hours per day.[1] Another study, done in Denmark with a research sample of teenagers, also discovered that digital screen usage accounted for roughly 25% of the reported prevalence of myopia, with the risk of myopia worsening if digital screen use exceeded 6 hours per day.[1] Several research findings support all of those claims, stating that each additional diopter hour of digital screen use is related to the increased likelihood of symptomatic myopia development, which can be translated as significant risks given the extended periods of time young children spend in front of screens.[2] So, it showed that the intensity of digital screen time use is

related to an increased chance of acquiring symptomatic myopia.[3] Based on all of the studies that mention a relationship between digital screen use and the progression of myopia, all of these statements make sense, where they explained that blue light emitted from screens, for example, has dangerous effects on the retinal pigment epithelium so that it can lead to retinal pigment epithelial dysfunction, that might result in axial elongation and the progression of pathological myopia.[4] It can even cause the outer blood-retinal barrier among the neuroretina and the choroid to become destabilized, resulting in crucial delays in retinal development signals. Indeed, it has been established that using near vision eyes causes the ciliary muscle to tighten, the refractive power of the retina will rise, the axis of the eye to lengthen, and myopic vision diseases may occur.[5,6]

Environmental factors do have a tremendous impact on the progression of myopia. These factors include exposure to light, lack of physical activity, and level of education.[7] Of these factors, less light exposure makes it difficult for the eye to focus properly or the increased pupil size during dark conditions allows more unfocused peripheral light rays to enter the eye, thus increasing the risk of myopia. This is also supported by research which states that less outdoor time and less light exposure are correlated with increased myopia prevalence and, in some reports, also with myopia progression.[8] An appraisal of the literature reveals several studies that report strong associations between screen time and myopia.

For instance, among 5-15 years old examined cross-sectionally in two studies in North India, the risk of myopia was 8 times higher with >2 hours/day of mobile and video game screen time compared to 0-2 hours/day in selected private schools, and 8 times higher with >4h/week of screen time compared to no screen time in a population-representative sample of randomly selected schools.

Myopia was also more prevalent in Irish children aged 6-7 years and 12-13 used smartphones for>3 hours/day compared to those with<1 hour/day of phone screen time (20.3% vs. 8.3%), while each additional minute of daily screen time among students aged 10-33 years, also in Ireland, was associated with a 2.6% increased risk of myopia.

Evidence from cohort studies also suggests that screen time may myogenic. The Copenhagen child cohort 2000 eye study reported that the prevalence of myopia was as high as 37-44% among Danish teenagers who used screens for >6h/day and just 0-0.6% among those with <0.5h/day of screen time, and after controlling for covariates, those with >6h/day of screen time had almost double the risk of myopia compared to those with <2 h/day.

Interestingly, one study of more than 26,000 2-7-year-old Chinese children reported that those whose initial exposure to mobile smart devices were at 0-1 year of age were 4.4 times more likely to have myopia than those who had not been exposed to screens.

METHODS

This was an analytic cross-sectional study. The study was conducted in the Department of Ophthalmology, Dhaka Medical College Hospital. The study was carried out over a period of 12 months from January 2025 to December 2025. Total of 93 participants were included in the study. All patients (Age>5) attending the department of ophthalmology in Dhaka Medical College Hospital. Participants were selected using a purposive sampling technique.

Inclusion criteria

Age: >5 years, both gender, all patient visiting the ophthalmology department with refractive error with history of digital device use, will provide informed written consent.

Exclusion criteria

Age 70 years old, severely ill patients, not willing to participate, any congenital and acquired pathology of the eye.

Data collection procedure

A structured questionaries will be used to collect data. Data collection technique: Before starting the study, formal ethical approval will be taken from the Ethical review committee (ERC) of Dhaka Medical College. After selection of participants in accordance to the inclusion and exclusion criteria, they will be approached for inclusion into the study.

Following informed about the study aim, objectives and procedure, written consent will be taken from each participant. History taking focusing clinical features, disease duration along with physical examination will be done as per standard protocol.

A complete eye evaluation will be performed for each patient by an ophthalmologist. A questionnaire will be made and will be pretested for interview. The questionnaire will include socio-demographics (age, sex, education, family income, residence etc.), diagnosis, clinical presentations of refractive error will be documented. After interview, result of these parameters will be noted.

Analysis of the study

Following data collection, the collected data will be assessed for completeness, accuracy and consistency before analysis was commenced. Data analysis will be carried out by using SPSS version 25 (IBM Corp., Armonk, NY). Exploratory data analysis will be carried

out to describe the study population where categorical variables will be summarized using frequency tables while continuous variables will be summarized using measures of central tendency and dispersion such as mean, median, percentiles and standard deviation. Qualitative or categorical variables will be described as frequencies and proportions. Chi-square will be used to determine the association between grades and time intervals. A level of p<0.05 will be considered statistically significant.

RESULTS

A total of 93 participants aged above 5 years were included in the analysis. Descriptive statistics were used to summarize demographic characteristics, patterns of smart device use, and refractive status. Associations between screen time exposure and severity of myopia were assessed using cross-tabulation and chi-square tests.

Table 1: Socio-demographic characteristics of the study participants (n=93).

Variables	Frequency (N)	Percentage (%)
Age group (years)		
5-10	24	25.8
11-15	32	34.4
16-20	21	22.6
>20	16	17.2
Sex		
Male	49	52.7
Female	44	47.3
Residence		
Urban	68	73.1
Rural	25	26.9

The majority belonged to the pediatric and adolescent age groups, participants aged 11-15 years constituted the largest group (34.4%), followed by those aged 5-10 years (25.8%). Males represented 52.7% of the study population, while females accounted for 47.3%. Most participants were from urban areas (73.1%), with a smaller proportion from rural settings (26.9%).

Table 2: Pattern of smart device use among participants (n=93).

Variables	Frequency (N)	Percentage (%)
Primary device used		
Smartphone	57	61.3
Tablet	18	19.4
Computer/laptop	12	12.9
Multiple devices	6	6.4
Purpose of use		
Education	38	40.9
Entertainment	31	33.3
Both	24	25.8

Smartphones were the most commonly used device, reported by 61.3% of participants, followed by tablets (19.4%) and computers or laptops (12.9%). A small proportion (6.4%) reported using multiple devices. Regarding the purpose of use, 40.9% used smart devices primarily for educational activities, 33.3% for entertainment, and 25.8% for both education and entertainment.

Table 3: Duration of daily smart device use (n=93).

Daily screen time (hrs)	Frequency (N)	Percentage (%)
<1	12	12.9
1-3	28	30.1
3-5	31	33.3
>5	22	23.7

About one-third of participants (33.3%) reported using smart devices for 3-5 hours per day, while 23.7% reported use exceeding five hours daily. Nearly 30% used devices for 1-3 hours per day, and only 12.9% reported screen time of less than one hour per day.

Table 4: Distribution of myopia severity among participants (n=93).

Degree of myopia (days)	Frequency (N)	Percentage (%)
Mild (<−3.00)	41	44.1
Moderate (−3.00 to−6.00)	34	36.6
Severe (>−6.00)	18	19.3

The distribution of myopia severity among participants. Mild myopia (<−3.00 diopters) was the most common, affecting 44.1% of participants. Moderate myopia (−3.00 to −6.00 diopters) was observed in 36.6%, while severe myopia (>−6.00 diopters) was present in 19.3% of cases.

Among participants using smart devices for less than one hour per day, 75% had mild myopia and none had severe myopia. In contrast, among those using devices for more than five hours per day, only 18.2% had mild myopia, while 45.4% had severe myopia. The proportion of moderate and severe myopia increased progressively with longer screen time, and this association was statistically significant (p<0.001).

Participants using smart devices for more than three hours per day had a significantly higher prevalence of moderate to severe myopia compared to those with lower screen exposure (81.1% vs. 18.9%, p<0.001). Urban residence was also significantly associated with moderate to severe myopia (p=0.032). Additionally, participants using smart devices primarily for educational purposes had a higher proportion of moderate to severe myopia compared to those with mild myopia, and this association was statistically significant (p=0.041).

Table 5: Association between daily screen time and severity of myopia (n=93).

Daily screen Time (hrs)	Mild N (%)	Moderate N (%)	Severe N (%)	Total	P value
<1	9 (75.0)	3 (25.0)	0 (0.0)	12	
1-3	17 (60.7)	9 (32.1)	2 (7.2)	28	
3-5	11 (35.5)	14 (45.2)	6 (19.3)	31	
>5	4 (18.2)	8 (36.4)	10 (45.4)	22	<0.001

Table 6: Association of selected factors with presence of moderate to severe myopia (n=93).

Variables	Moderate–severe Myopia N (%)	Mild myopia N (%)	P value
Screen time>3 hrs/day	43 (81.1)	10 (18.9)	<0.001
Urban residence	39 (57.4)	29 (42.6)	0.032
Educational screen use	28 (73.7)	10 (26.3)	0.041

DISCUSSION

This study investigates the relationship between daily screen time and the severity of myopia among participants attending the ophthalmology department of Dhaka Medical College and Hospital. The results reveal a significant association between prolonged screen time and more severe forms of myopia. These findings contribute to the growing body of evidence on the detrimental effects of excessive digital device use on ocular health, particularly among children and adolescents. The demographic characteristics of the study population, reveal that the majority of participants were aged between 11 and 15 years (34.4%), which is consistent with the age group most affected by myopia in previous studies. The study's participants were predominantly male (52.7%) and urban residents (73.1%), suggesting that factors such as gender and environment may influence screen time patterns and myopia prevalence.

These demographic trends align with studies suggesting that urban children, who have greater access to digital devices, are more likely to develop myopia than their rural counterparts.[9] That smartphones were the most commonly used device (61.3%), followed by tablets (19.4%) and computers (12.9%). This pattern reflects the global trend of increasing smartphone usage, particularly among young people, due to the growing availability of mobile apps for both education and entertainment. The primary purpose of device use was educational (40.9%), but a significant proportion of participants also used their devices for entertainment (33.3%). This finding supports previous research suggesting that prolonged screen exposure for both recreational and academic purposes is linked to higher myopia risk.[10] Highlights the daily screen time habits of participants, with 33.3% of participants using devices for 3-5 hours per day, and 23.7% using them for more than 5 hours.

This finding is consistent with other studies that report the growing trend of children and adolescents spending excessive time on screens, particularly during the COVID-19 pandemic, which forced many students into virtual learning environments. The correlation between longer screen time and myopia progression is particularly concerning, as it supports the theory that prolonged close-up screen activities contribute to ocular strain and worsening refractive errors.[11] The relationship between screen time and myopia severity, reveals a striking pattern: 75% of participants who used screens for less than 1 hour per day had mild myopia, while 45.4% of those who used devices for more than 5 hours daily had severe myopia.

This progressive increase in severity with greater screen time is consistent with the findings, who noted that prolonged screen uses significantly increased the likelihood of myopia in teenagers. Similarly, Liu et al, observed that e-learning and increased screen time during the pandemic led to a notable increase in myopia progression among students.[12] The significant association between screen time and myopia severity in this study aligns with the results of cohort studies that report a clear dose-response relationship between screen time and the progression of myopia. The Copenhagen child cohort 2000 Eye Study, for instance, found that teenagers who used screens for more than 6 hours daily were twice as likely to develop myopia compared to those with less than 2 hours of screen exposure. The current study’s finding that participants using screens for more than 3 hours per day had significantly higher rates of moderate to severe myopia further corroborates these results. In addition, urban residence was significantly associated with more severe forms of myopia (p=0.032). This finding is in line with previous studies, such as that by Wong et al which found that children living in urban areas are at a higher risk of developing myopia due to greater screen exposure and less outdoor activity.[13]

Similarly, studies have consistently shown that urbanization is a key factor in the increasing prevalence of myopia worldwide. Another notable finding the association between educational screen use and myopia severity (p=0.041). Participants who used their devices for educational purposes were more likely to have moderate to

severe myopia. This aligns with the findings of Mohan et al, who reported that excessive screen time for e-learning during the pandemic significantly contributed to myopia progression in children.[14]

Given the ongoing reliance on digital devices for education, this highlights the need for strategies to balance screen use with outdoor activities to mitigate the effects on eye health. The findings of this study corroborate those of numerous other studies linking prolonged screen time to myopia progression. A study by Saxena et al, found a similar dose-response relationship between screen time and myopia, particularly in urban school children who spent extended periods on mobile devices.[3] Likewise, a large-scale study by Ip et al, demonstrated that prolonged near work, including screen time, is a major risk factor for myopia development among children, reinforcing the findings of the current study.[15]

However, while the evidence linking screen time to myopia is robust, some studies have suggested that the effect of screen time on myopia progression may be mediated by other factors, such as genetics or socioeconomic status. For instance, studies by Zadnik et al, and Jones et al, indicated that genetic predisposition and parental history of myopia also play significant roles in myopia progression, independent of screen time exposure.[16,17]

CONCLUSION

This study highlights the significant relationship between prolonged smart device use and the increased severity of myopia, particularly among children and adolescents. The results emphasize that excessive screen time, especially beyond three hours per day, is associated with higher myopia severity, underscoring the importance of limiting screen exposure to mitigate its impact on ocular health. Given the growing reliance on digital devices for both educational and recreational purposes, it is crucial to implement preventive strategies to protect eye health and reduce the risk of myopia progression, especially in younger populations.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Hansen MH, Laigaard PP, Olsen EM, Skovgaard AM, Larsen M, Kessel L, et al. Low physical activity and higher use of screen devices are associated with myopia at the age of 16-17 years in the CCC2000 eye study. Acta Ophthalmologica. 2019;98(3):315-21.
2. Liu J, Li B, Chen Q, Dang J. Student Health Implications of School Closures during the COVID-19 Pandemic: New Evidence on the Association of e-Learning, Outdoor Exercise, and Myopia. Healthcare (Basel). 2021;9(5):500.
3. Saxena R, Vashist P, Tandon R, Pandey RM, Bhardawaj A, Gupta V, et al. Incidence and progression of myopia and associated factors in urban school children in Delhi: The North India Myopia Study (NIM Study). PLoS One. 2017;12:e0189774.
4. Narimatsu T, Negishi K, Miyake S, Hirasawa M, Osada H, Kurihara T, et al. Blue light-induced inflammatory marker expression in the retinal pigment epithelium–choroid of mice and the protective effect of a yellow intraocular lens material in vivo. Exp Eye Res. 2015;132:48-51.
5. Khader YS, Batayha WQ, Abdul-Aziz SM, Al-Shiekh-Khalil MI. Prevalence and risk indicators of myopia among school children in Amman, Jordan. East Mediterr Health J. 2006;12:434-9.
6. Pellegrini M, Bernabei F, Scorcia V, Giannaccare G. May home confinement during the COVID-19 outbreak worsens the global burden of myopia?. Graefes Arch Clin Exp Ophthalmol. 2020;258:2069-70.
7. Montag C, Elhai JD. Discussing digital technology overuse in children and adolescents during the COVID-19 pandemic and beyond: On the importance of considering affective neuroscience theory. Addict Behav Rep. 2020;12:100313.
8. Portello JK, Rosenfield M, Bababekova Y, Estrada JM, Leon A. Computer-related visual symptoms in office workers. Ophthalmic Physiol Opt. 2012;32:375-82.
9. Fan DSP, Lam DSC, Lam RF, Lau JTF, Chong KS, Cheung EYY, et al. Prevalence, incidence, and progression of myopia of school children in Hong Kong. Invest Ophthalmol Vis Sci. 2004;45:1071-5.
10. Wu PC, Chen CT, Lin KK. Myopia prevention and outdoor light intensity in a school-based cluster randomized trial. Ophthalmology. 2018;125:1239-50.
11. Chang P, Zhang B, Lin L, Chen R, Chen S, Zhao Y, et al. Comparison of the myopic progression before, during and after COVID-19 lockdown. Ophthalmology. 2021;128:1655-7.
12. Liu J, Li B, Chen Q, Wang J, Zhang Y, Zhou Y. Student health implications of school closures during the COVID-19 pandemic: New evidence on the association of e-learning, outdoor exercise, and myopia. Healthcare (Basel). 2021;9(5):500.
13. Wong L, Coggon D, Cruddas M, Hwang CH, Ho W, Tay M. Education, reading, and familial tendency as risk factors for myopia in Hong Kong fishermen. J Epidemiol Community Health. 1993;47(1):50-3.
14. Mohan A, Sen P, Peeush P, Shah C, Jain E. Impact of online classes and home confinement on myopia progression in children during COVID-19 pandemic: Digital eye strain among kids (DESK) study 4. Indian J Ophthalmol. 2022;70(1):241-5.
15. Ip JM, Saw SM, Rose KA, Morgan IG, Kifley A, Wang JJ, et al. Role of near work in myopia: Findings

in a sample of Australian school children. Invest Ophthalmol Vis Sci. 2008;49(7):2903-10.
16. Zadnik K, Mutti DO, Friedman NE, Adams AJ. Initial cross-sectional results from the Orinda longitudinal study of myopia. Optom Vis Sci. 1993;70:750-8.
17. Jones LA, Sinnott LT, Mutti DO, Mitchell GL, Moeschberger ML, Zadnik K. Parental history of myopia, sports and outdoor activities and future myopia. Invest Opthalmol Vis Sci. 2007;48:3524-2.

Cite this article as: Tima FT, Liza TY, Alam SA, Mukta KN, Zafullah TA, Shorna SN, et al. Association between smart device use and change in myopia in the OPD of a tertiary eye hospital. Int J Res Med Sci 2026;14:xxx-xx.