

Screen Time and its Relation with Ophthalmic Problems among Medical Students

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ABSTRACT

Background: The inflated use of digital screens has completely changed the lives of people physically, mentally and psychologically. The covid-19 pandemic has also compelled people of all age groups to shift to digital media. The average screen time usage is 7-9 hours a day which is alarming.

Aim: To find out the relation of screen time with ophthalmic problems among medical students.

Study Design: Cross-sectional study

Place and Duration of Study: Department of Community Medicine, HITEC-IMS Taxila from 1st January 2020 to 30th June 2020.

Methodology: One hundred and fifty two medical students were included using non probability convenience sampling technique. An electronic questionnaire was developed and Google forms were used for data registration.

Results: The relation between screen time duration with difficulty in refocusing ($p=0.05$) and eye redness ($p=0.05$). No relation was found between screen duration and headache, eye strain, blurred vision and refractive errors.

Conclusion: High screen time is found to be related to ophthalmic problems like difficulty refocussing and eye redness which if not addressed properly might result in detrimental effects.

Keywords: Ophthalmic problems, Screen time, Digital devices

INTRODUCTION

The outburst of cyber gadget ownership in the previous five years has created a substantial shift in how the youth uses technology.¹ The use of technology, particularly digital electronic devices has become a part and parcel of the modern daily life style. The 21st century exposes people either directly or indirectly to a vast array of digital electronic displays. These may be used for leisure or for work purposes. However, like everything else, excessive screen time, particularly the use of mobile phones, laptops and e-readers etc. can have detrimental effects on one's health. People of this modern age are severely accustomed to screens, especially smart phones. According to a research in Korea, it was found that around 45% of mobile phone users felt nervous when they were not holding their mobile phones.² Since digital technology relies on blue light release, therefore chances are, that one may damage their vision due to the shorter wavelength of light, when used for extended periods of time.³ According to findings of a research in Shanghai, 94.9% of undergraduate students were myopic, on the other hand an alarmingly high percentage of 96.9% of post graduate students suffered from myopia, and among all the myopes, 19.5% were high myopes.⁴ Another international study correlating the impact of computer usage with students' health shows that 90% of the respondents do not follow proper computer usage advisories consequently, 95% of them still experience unpleasant effects on their health due to improper use of computers.⁵

An excessively unhealthy amount of time spent in front of a screen has been linked to psychological, physiological, metabolic as well as behavioural problems but 'ophthalmic problems' unequivocally pose the biggest threat. According to a survey of Pakistan Telecommunication Association (PTA), South Asia has faced technology explosion especially Pakistan, where the number of mobile phone users has crossed 139.2 million. There is a notorious relationship between screen time use and ocular abnormalities stretching from simple strain and headache to refractive errors particularly myopia. According to a cross-sectional study conducted at Government College Rawalpindi, the ocular symptoms like tired eyes, blurred vision, eye strain, glare discomfort, irritated eyes and dry eyes were experienced after persistent screen usage.⁶

The most prominent symptoms fall into two main groups: symptoms associated with accommodative or binocular vision stress, and others are external symptoms associated with dry

eyes.⁷ Persistent visual fatigues can lead to a variety of other ocular problems such as ocular pain, damaged corneal epithelial cells, conjunctival hyperaemia, and decreased visual acuity. The accumulation of visual fatigue also adversely affects the visual feedback processing that connects the vestibular organ system with the somatosensory network and can cause an additional interruption in the body's postural control system.³

Digital device usage has exponentially increased particularly in medical students. As there was less significant data found regarding this topic in this geographical location therefore, the aim of this study is to determine any relation between excessive screen time and ophthalmic problems among medical students.

MATERIALS AND METHODS

This cross-sectional study survey was conducted at Department of Community Medicine, HITEC-IMS Taxila from 1st January 2020 to 30th June 2020 and the sample size was calculated 152 by using Krejcie and Morgan table. Convenience sampling technique was used for the selection of target respondents. The students who participated in this study were all medical students aging between 18 to 24 years. They were all healthy and exhibited no bodily deformity or disorder. An electronic questionnaire was developed on Microsoft word and Google forms were used for data registration. The data was collected, summarized and statistically analyzed through SPSS-25.0. Chi square test of association was used to calculate association between different variables.

RESULTS

There were 37 males and 115 females students and average screen time usage of students in a day is shown in Fig. 1. 50% students used their electronic devices in the dark for 1-2 hours, 36.8% students used their devices for 3-4 hours, and 7.2% students used them for 5-6 hours while 5.9% used their devices for more than 6 hours. Out of all the refractive errors noted myopia was found to be present in 38.16% of students. For the correction of their refractive error, majority 59 (38.8%) students use glasses as shown in Fig. 2.

Refractive error was found to be significant with age (p value: 0.01), gender (p value: 0.003) and the year of medicine students were studying (p value: 0.006). Regarding problems associated with screen usage, majority 67.8% experienced headache, 27.6% had refocusing difficulty, 48% experienced eye

strain, 22.4% had blurring of vision, 19.7% had redness of eye and only 5.9% experienced dry eyes.

The positive association of screen time and difficulty in refocusing eyes ($p < 0.05$) and eye redness ($P < 0.05$) and no association was found between screen time and other symptoms like headache, eye strain, and dry eyes and blur vision. Considering the knowledge and practice at personal level 83.6% students agree that screen usage has impact on health, 90.1% students think that their symptoms get better by reducing screen time while 53.3% of the students didn't maintain the optimal distance between screen and eyes. Maintenance of optimal distance was found to be significant with blurring of vision ($p = 0.02$). In regard to the effort for reducing screen time only 21.1% students put an active effort to reduce their screen time (Table 1).

Table 1: Comparison of hours spent on screen overall

Independent variable	Dependent variable	P value
Hours spent on screen overall	Presence of refractive errors	0.38
	Difficulty refocusing	0.05
	Eye redness	0.05
	Headache	0.60
	Eye strain	0.20
	Dry eyes	0.25
	Blur vision	0.27

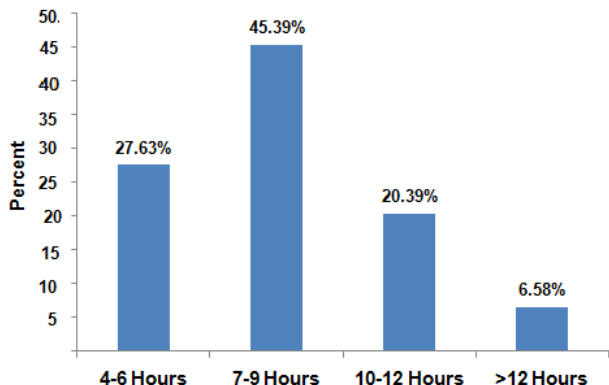


Fig 1: Average screen time (hours) of students in a day

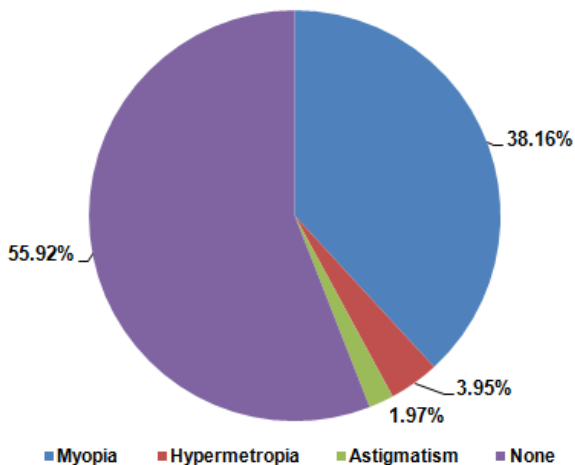


Fig 2: Prevalence of refractive error among students

DISCUSSION

The purpose of this systematic review and meta-analysis was to determine the relationship between screen time usage and ophthalmic problems among the undergraduates of HITEC IMS, Taxila, Pakistan lying in age group between 18 to 23 years. A notable association is determined between age and presence of

refractive error which is compatible with research conducted in Delhi.⁸ According to the study conducted in Madhya Pradesh India⁹ refractive errors are common among girls, another study conducted in China supports this fact that females are more myopic than males.¹⁰ This is in line with our research which shows an association between refractive error and gender ($p = 0.003$)

Considering knowledge and preventive practices amongst undergraduates of HITEC IMS, we determined age has relation with perspective that screen usage has impact on health and it is correlated with a finding of a national research.¹¹ In a study conducted in China majority respondents were myopes which supports our data as majority of our students with refractive errors were myopes.¹⁰

Results shows a significant relation of optimum distance from screen and blurring of vision which are in accordance with international research.⁵ Although no relation was found between optimum screen distance and difficulty in refocussing because our research included medical students and most of them are well aware of it. From previous few researches it is proved that refractive error has genetic basis¹² which augments our results.

The present study stated that there is no notable association between screen usage and presence of refractive error as it is stated in a research KIST Medical College.¹³ In our study we only found a relation of eye redness and difficulty in refocussing with hours spent on screen while all other ocular problems were not related to screen time. This is contradictory to Korean research which says more 2 hours spent on screen causes multiple ocular problems² the reason could be that evaluation was done through questionnaire and responses were objective. Our result shows a relation between year of medicine and presence of refractive error and it is backed up by the findings of another research conducted at Nanjing.⁴ Eye strain was found interrelated to the mode of study especially amongst those who study from various types of screen these findings coincides with the results of study conducted at university of Paris, France.¹⁴

We determined, refractive errors have multifactorial base, screen time usage per day is not specifically related with occurrence of refractive error but maintenance of optimum distance from screen has a significant role in minimizing ocular complains. Another study in France¹⁵ claims that symptom like headache isn't analogous to screen time supporting our study. Studies regarding correlation of gender with use of blue filter and presence of refractive error with ocular discomfort problems, is limited we didn't find much references.

CONCLUSION

The surge in ophthalmic problems like difficulty refocussing and eye redness is found to be related with a high screen time however we didn't find any relation with headache, eyestrain, blurred vision. Moreover, a notable relationship was seen between refractive error and gender which is more common in girls. Judicious time management of screens is essential for optimal ophthalmic health especially in the days of Covid pandemic. Our society needs to promote visual health amongst people especially youngsters, by recommending few practices like eye breaks after doing work, eye exercise, and opportunities for more outdoor activities, minimizing the use of display screen unnecessarily and most importantly maintain a safe distance from screen.

REFERENCES

- Parent J, Sanders W, Forehand R. Youth Screen Time and Behavioral Health Problems: The Role of Sleep Duration and Disturbances. *Physiol Behav* 2017; 176: 139-48.
- Kim DJ, Lim C, Gu N, Park CY. Visual fatigue induced by viewing a tablet computer with a high-resolution display. 2017; 31: 388-93.
- Park YH, An CM, Moon SJ. Effects of visual fatigue caused by smartphones on balance function in healthy adults. *J Phys Ther Sci* 2017; 29: 221-3.
- Huang L, Kawasaki H, Liu Y, Wang Z. The prevalence of myopia and the factors associated with it among university students in Nanjing: a cross-sectional study. *Medicine (Baltimore)* 2019; 98: e14777.

5. Billones RKC, et al. Digital eye strain and fatigue recognition using electrooculogram signals and ultrasonic distance measurements. 2018 IEEE 10th Int. Conf. Humanoid, Nanotechnology, Inf. Technol. Commun. Control. Environ. Manag. HNICEM 2018 (2019)
6. Maroof S, Mashhadi SF, Azam N, Haider K, Arshad N, Zulfiqar S, et al. Relationship of screen hours with digital eye strain: a cross sectional survey from teenagers. 2019; 69: 182-6.
7. Sheppard AL, Wolffsohn JS. Digital eye strain: Prevalence, measurement and amelioration. *BMJ Open Ophthalmol* 2018; 3:
8. Saxena R. 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: 1–12.
9. Murali K, Vidhya C. Pattern of wavefront aberrations in Indian children with ametropia. *J Clin Ophthalmol*. 2018; 6: 117–20.
10. Sun J. High prevalence of myopia and high myopia in 5060 Chinese University students in Shanghai. *Investig Ophthalmol Vis Sci* 2012; 53: 7504–9.
11. Sayed SH, Youssef A, Aziz AA, Madian M. Effect of interactive digital-based educational intervention about digital eye strain on the severity of eye complaints, knowledge and preventive ergonomic practices among computer users. 2020.
12. Yang GY. Associations between screen exposure in early life and myopia amongst Chinese preschoolers. *Int J Environ Res Public Health* 2020; 17: 1–16.
13. Basnet A, Basnet PS. Usage of illuminated screen as a risk factor for refractive error in children. *J KIST Med Coll* 2019; 1: 6–10.
14. Benedetto S, Draï-Zerbib V, Pedrotti M, Tissier G, Baccino T. E-readers and visual fatigue. *PLoS One* 2013; 8.
15. Montagni I, Guichard E, Carpenet C, Tzourio C, Kurth T. Screen time exposure and reporting of headaches in young adults: a cross-sectional study. *Cephalgia* 2016; 36(11): 1020–27.