

Original Research Article

Digital eye strain among undergraduate medical students: a cross-sectional study at a tertiary care centre

Srushti D. Pimple*, Mahavir P. Nakel, Bharat B. Chavan

Department of Community Medicine, Government Medical College, Chhatrapati Sambhajnagar, Maharashtra, India

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*Correspondence:

Dr. Srushti D. Pimple,

E-mail: srushtidpimple@gmail.com

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ABSTRACT

Background: Digital devices have become very important in education. Students are increasingly spending their time on screen for education and other use. However, prolonged screen exposure has led to increasing complaints of digital eye strain, an emerging public health concern.

Methods: A cross-sectional study was conducted among 165 undergraduate medical students in a tertiary care centre. A pilot studied; semi-structured questionnaire was used for data collection. Data was entered in Microsoft excel and analysed.

Results: The prevalence of digital eye strain among undergraduate medical students was found to be 52.7%. Most common symptom noted were Headache (68.5%), Itching (60.6%), tearing of eyes (58.1%). There was a significant association between the duration of mobile screen usage (>4 hours) and digital eye strain (p value=0.0303).

Conclusions: Digital eye strain is a common health concern among medical students. Higher the hours of mobile screen use, greater is the risk of digital eye strain.

Keywords: Digital eye strain, Prevalence, Screen usage, Headache, Undergraduate medical students

INTRODUCTION

Digital eye strain is defined by the American optometric association as encompassing a range of visual and ocular symptoms arising due to prolonged use of digital electronic devices.¹ In early times use of computer was confined for specific population using it for work, as a developing country and adoption of digitalization usage of computer, laptop, tab and smartphone increased. Development of technology in education has brought in a noticeable transformation in the methods of teaching, presenting information and sources for studying. Students prefer to use laptop, tablets, smart phones for educational and entertainment purpose.¹ There has been a significant rise in digital device usage in the recent years with an average use of 4-5 hours per day.²

When the demand for near work increases need to perform activities including typing, reading, and writing. It requires

intense visual efforts, focusing at various distances, mainly from intermediate to near with different accommodation and convergence demands. They also require good coordination of eye movements to observe objects at various distances like paper to screen and keyboard so that adequate binocular vision is obtained, due to that people develops discomfort.³ The prolonged exposure leads to various symptoms that can be put together as digital eye strain.

Digital devices cause harm by emitting short high energy waves that can penetrate the eyes and can eventually contribute to photochemical damage to the retinal cells, making an individual vulnerable to a variety of eye problems ranging from dry eye to age-related macular degeneration.⁴ Increasingly dependent on these devices specifically for education and entertainment. It is estimated that globally around 60 million people suffer with digital eye strain.⁵ Almost 75% people uses computer in daily activities.⁶ Consequently, digital eye strain can be

considered to be an emerging public health threat. Therefore, this study conducted to estimate the prevalence of digital eye strain among undergraduate medical students.

This study is aiming to estimate the prevalence of digital eye strain among undergraduate medical students. Our objectives are to study association of sociodemographic factors and screen usage patterns with digital eye strain.

METHODS

A cross-sectional study conducted at a tertiary care centre among undergraduate medical students from September - November 2025.

Sample size calculated by using 95% confidence interval, a margin of error of 5%, and a prevalence of digital eye strain of 11% among medical college students from a previous study.⁷ By putting these values in Cochran's formula. Sample size of 165 achieved.

A pilot studied semi structured questionnaire used as a study tool, and to find out whether DES present or not we used validated questionnaire and also added other questions.³

Inclusion criteria

Undergraduate medical students at a tertiary care centre those who gave consent for study were included.

Exclusion criteria

Those undergraduate medical students having serious eye issues like conjunctivitis and recent eye injury, and those who were not willing to participate were excluded.

RESULTS

In this study we noted out of 165 participants 87 has digital eye strain, so the prevalence of digital eye strain among undergraduate medical students was found to be 52.7.

There was no significant association between age, gender, academic year, computer or laptop or tab screen usage duration, purpose of screen use and having refractive error or not with digital eye strain (p value >0.05). and there was significant association between the duration of mobile screen usage (>4 hours) and digital eye strain (p value=0.0303) (Table 1).

Table 1: Association of sociodemographic factors, screen usage patterns with digital eye strain.

Dependent variables		Digital eye strain		Chi square (p value)
		Present (n=87)	Absent (n=78)	
Age (in years)	≤ 20	35	32	0.0108 ($p=0.9172$)
	>20	52	46	
Gender	Male	41	32	0.6205 ($p=0.4309$)
	Female	46	46	
Academic year	First year	34	23	3.1584 ($p=0.3678$)
	Second year	29	25	
	Third year	16	17	
	Final year and intern	08	13	
Mobile screen usage	≤ 4 hour	19	29	4.6919 ($p=0.0303$)
	>4 hour	68	49	
Computer/laptop/tab usage	No use	35	31	1.40 ($p=0.4980$)
	≤ 4 hour	33	35	
	>4 hour	19	12	
Most of your screen usage is for	Educational purpose	27	34	2.7822 ($p=0.0953$)
	Entertainment purpose	60	44	
Refractive error	Yes	59	49	0.45 ($p=0.50$)
	No	28	29	

Severity grade of digital eye strain - DES score >6 DES present 6-12 mild, 13-18 moderate, and 19-32 severe.³ Total 87 participants has digital eye strain out of that 59 (67.9%) mild, 17 (19.5%) moderate, 11 (12.6%) severe grade of DES (Table 2).

Most common symptom noted by participants were headache 113 (68.5%), itching 100 (60.6%), tearing of eyes 96 (58.1%) (Figure 1).

Table 2: Severity grades of digital eye strain (n=87).

Severity grades of DES	DES present
Mild	59 (67.9%)
Moderate	17 (19.5 %)
Severe	11 (12.6%)

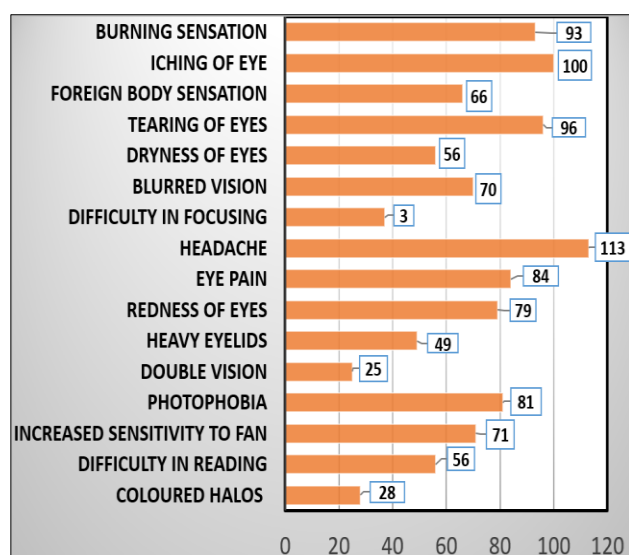


Figure 1: Common eye symptoms among study participants.

DISCUSSION

The overall prevalence of digital eye strain among undergraduate medical students was found to be 52.7%. A similar study by Karmacharya et al reported a higher prevalence of around 68.1% as compared to our study.⁸

Current study shows most common symptoms as headache, itching, tearing of eyes Mohammed et al reported neck pain, headache, and watering of the eyes as the most common, Karmacharya et al, burning sensation, worsening eyesight, and eye pain as the most common, Sharma and Kumar, reported headache, pain in the neck and shoulder and blurring of vision as most common and Warad et al reporting eye strain, headache and frequent rubbing of eyes as the most common symptoms.^{1,8-10} It shows that headache found to be common symptoms of DES by various studies but there is no prominent symptom that is pathognomonic of DES and any of these symptoms can lead to the suspicion of DES.

Our study did not find any statistically significant association between DES and age, gender, academic year, computer, laptop or digital tablets use. In various studies sex of students was found to influence the prevalence of DES. Khan et al reported a higher prevalence of DES among females.² Sharma et al and Chwala et al, reported a higher prevalence of symptoms of DES among females.^{10,11} Mohan et al reported males are more vulnerable to symptoms of DES.¹² However, Logaraj et al found that males and females have different sets of predominant symptoms.¹³

This study shows significant association between the duration of mobile screen usage (>4 hours) and digital eye strain. (chi square value=4.6919, $p=0.0303$, significantly associated with the risk factor under study). This finding is

similar to the finding of many other similar studies like Mohammed et al, Mohan et al, and Warad et al.^{1,9,12}

CONCLUSION

Digital eye strain is a common and growing health concern among medical students and needs urgent attention. Digital eye strain found in 52.7% study participants. Owing to consistent and long hours of mobile screen usage, risk of getting digital eye strain is higher among study participants. Headache, itching of eyes and tearing were the most frequently reported symptoms of digital eye strain.

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