Section: Ophthalmology

Original Research Article

A QUESTIONNAIRE BASED STUDY: DIGITAL EYE STRAIN AMONG UNDERGRADUATE MEDICAL STUDENTS IN A MEDICAL COLLEGE OF EASTERN BIHAR

Harshika[1],Atul Mishra[2], Himanshu Kumar[3]Santosh Kumar Singh[4]

[1]Junior Resident, Department of Ophthalmology, Katihar Medical College, Katihar, Bihar, India
[2]Professor & Head of Department, Department of Ophthalmology, Katihar Medical College, Katihar, Bihar, India
[3]Associate Professor, Department of Ophthalmology, Katihar Medical College, Katihar, Bihar, India
[4]Assistant Professor, Department of Ophthalmology, Katihar Medical College, Katihar, Bihar, India

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Corresponding Author:
Dr. Himanshu Kumar
Email: dr.hkumar@yahoo.co.in

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Abstract

Background: The aim is to ascertain the prevalence of digital eye strain (DES) among undergraduate medical students in a tertiary eye care centre located in eastern Bihar. Additionally, it seeks to identify the practices of undergraduate medical students with respect to the prevention and prevalence of digital eye strain. **Materials and Methods:** After receiving ethical approval from the institutional ethics committee, a cross-sectional questionnaire-based study on undergraduate medical students was conducted at Katihar Medical College over the course of one month. The completed questionnaire was collected, and data was tabulated and analysed. **Result:** Out of the 465 patients in our study, 293 had symptomatic DES. 56.99% of the affected were females. The most frequent symptom reported was headache (57.20%), which was followed by tearing and burning sensation. Of the 317 people who used their digital devices for more than four hours a day, 251 had symptomatic DES, as did 159 (70.04%) of the 227 participants who held their device at a distance of less than 33 cm. Of the 37 seldom users of spectacles, 28 showed DES symptoms. Of the 259 people who wore spectacles, 165 had antiglare devices, and only 26 of them showed DES symptoms. Every one of the seven regular contact lens wearers showed DES symptoms. **Conclusion:** Women are more likely to experience DES, and the risk of DES increases with the amount of time spent using digital devices. It is therefore advised to have a higher contrast and a longer viewing distance as these factors lower the risk of acquiring DES. Regular use of antiglare with habitual refractive correction is advised; however, extended contact lens wear, particularly in air-conditioned environments, should be avoided.

INTRODUCTION

Due to the exponential rise in the use of digital gadgets over the past few years, digital eye strain has become a severe issue. After staring at a screen for more than two hours straight, many people experience physical discomfort, including headaches, neck, and shoulder pain, as well as eye dryness, blurriness, and wetness. Computer vision syndrome is "a complex of eye and vision problems related to near work experienced during computer use," according to the American Optometric Association.[1] Digital eye strain is also the term used to describe the group of these symptoms.[2] The way that knowledge is presented, how it is taught, and how it is accessed by students have all undergone significant change as a result of the advancement of technology in education. In order to relieve themselves of the stress of carrying heavy books, students prefer to use laptops, tablets, and cell phones for academic as well as recreational purposes. A health-related issue was highlighted despite this easy way of life. At a young age, undergraduate medical students from all over the world who live away from home for an extended period in a dorm adopt digital devices for communication with family, socializing with peers, playing games to relieve stress, and academic activities like preparing for seminars and symposiums and staying up to date with recent developments in the medical field. Around 60 million people are thought to be affected by this illness worldwide.[3] Computer use is a part of around 75% of daily activities.[4] Therefore, the current study's objective is to evaluate the prevalence, signs, and risk factors of digital eye strain, especially in undergraduate medical students.

Aim

This study aims to ascertain the prevalence of digital eye strain (DES) among undergraduate medical students in a tertiary eye care centre located in eastern Bihar. Additionally, it seeks to identify the practices of undergraduate medical students with respect to the prevention and prevalence of digital eye strain.

MATERIALS AND METHODS

A questionnaire based cross-sectional descriptive study was conducted for a period of 1 month from 1st October to 31 0ctober 2023 among undergraduate medical students of Katihar medical college, Katihar. Ethical clearance was obtained from the Institute's Ethics Committee on human subject research (Ref:KMC/IEC/DEPT.RES./001/2023(OPHTHAL MOLOGY).After receiving written informed consent, the participant was given the study's information sheet and asked to complete the validated questionnaire. Those who were not willing to be part of the study and were not available during the time of the study were excluded. The completed survey was gathered. Incomplete forms were rejected.

The DES symptoms and its severity were measured using Computer vision syndrome questionnaire (CVS-Q) developed by Sengui et al.[5] The CVS-Q evaluated the intensity (moderate or intense) and frequency (never, occasionally, or always /often) of 16 eye strain related symptoms, including burning sensation, itching in the eyes, foreign body sensation, watering, excessive blinking, redness, eye pain, heaviness in the eyelids, dryness, blurring of vision, double vision, difficulty in near vision, intolerance to light,colored halos,worsening of vision and headache. Frequency was recorded as follows; NEVER = symptoms didn't occur at all, OCCASIONALLY= sporadic symptoms or once a week, often or always= 2-3 times in a week or almost daily. Intensity was recorded as moderate or severe. The total score was calculated applying the following formula

$$\text{Score} = \sum_{i=1}^{16} (\text{Frequency of symptoms occurrence} \times \text{intensity of symptoms});$$

Where,

Frequency: Never=0, occasionally=1,often or always =2

Intensity: moderate =1, intense=2

If the total score was >6 points, the students were considered to be suffering from digital eye strain. DES scores were further categorized as mild (DES score=6-12), moderate (DES score= 13-18) and severe (DES score = 19-32).

All data collected were entered into a Microsoft XP excel spreadsheet and converted to SPSS version 23.Chi square was employed to analyze correlation, while descriptive statistics was used for frequency analysis. A P value <0.05 was level considered statistically significant.

RESULTS

Out of the 500 MBBS students,465 (93%) students who submitted the completely filled questionnaire were included in this study. Among 465 students ,256(55.05%) were male and 209 (44.94%) were female [Figure1].The age of the students ranged from 18 to 30 years with mean age of 24 [Figure2]. Majority of the students who took part in the study were from third year MBBS i.e. 105(22.58%) followed by first year MBBS students 101(21.72 %), followed by intern students 90(19.35%), followed by final year 88(18.92%) & then second year MBBS 81 (17.41%). [Figure3].

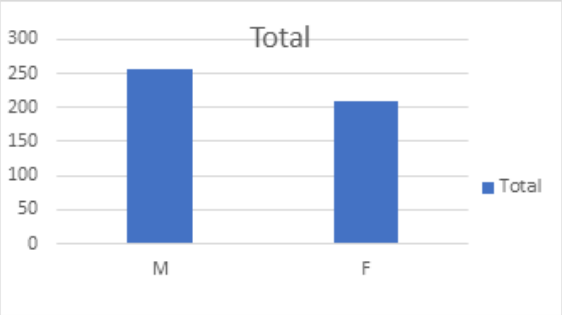

Figure 1: Distribution of subjects by gender

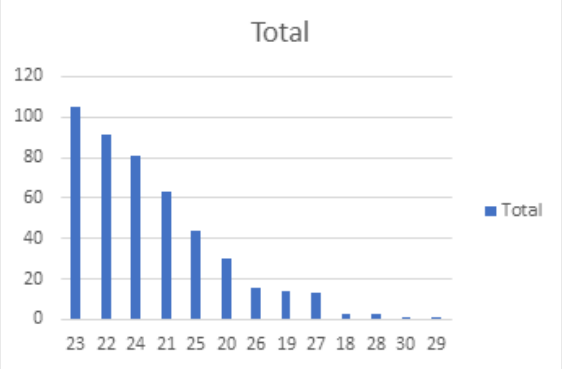

Figure 2: Distribution of subjects by age

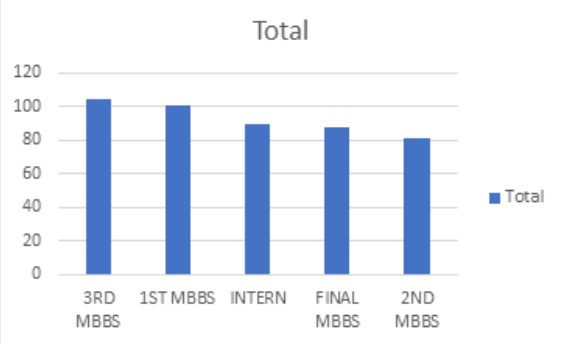

Figure 3: Distribution of subjects by Education Status

The DES score was determined by calculating the frequency and intensity of symptoms that occurred when using digital devices. If a student's overall score

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was greater than six, they were considered to have DES. According to [Table1], there were more females affected by DES (167, or 56.99%) than males (126, or 43.00%) in our study, where the prevalence of DES was 63.01% (n= 293).

Depending on the number of points obtained, the DES was rated as mild, moderate, or severe. 33 students (7.09%) had a moderate DES grade, while the majority of our students (n=256, 55.05%) had mild DES grade. 4 (0.86%) of our students had severe DES [Figure 4].

Headache (n=266,57.20%) was the most frequent ocular symptom reported by students, followed by tearing (n=255,54.83%), burning sensation (n=254,54.62%), and eyestrain (n=248,53.33%). The symptoms that were least common were halos surrounding the object (n=88,18.92%) and vision doubling (n=94,20.21%). Figures 5 and 6 display the frequency and severity of various symptoms related to digital eye strain, respectively. Of the 293 students with DES symptoms, 106 students (22.79%) visited an ophthalmologist because of their symptoms, while the remaining 359 study participants (77.20%) did not see an ophthalmologist because of their DES symptoms.

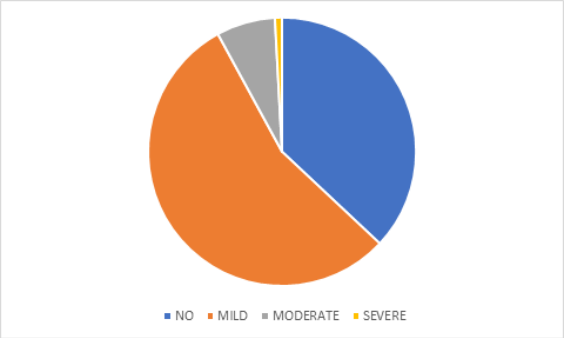

Figure 4: Prevalence of digital eye strain

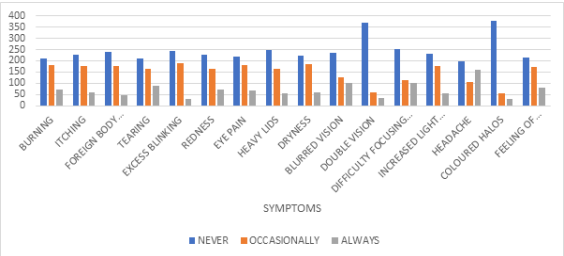

Figure 5: Frequency of digital eye strain symptoms

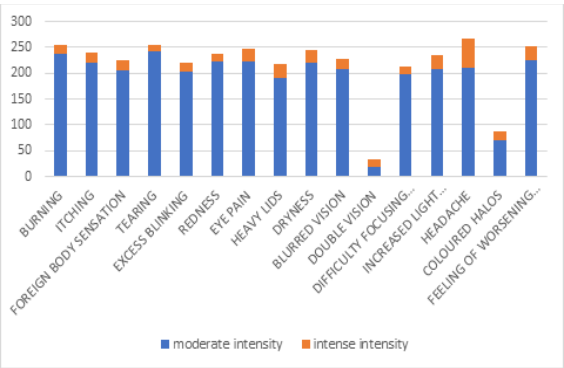

Figure 6: Intensity of digital eye strain symptoms

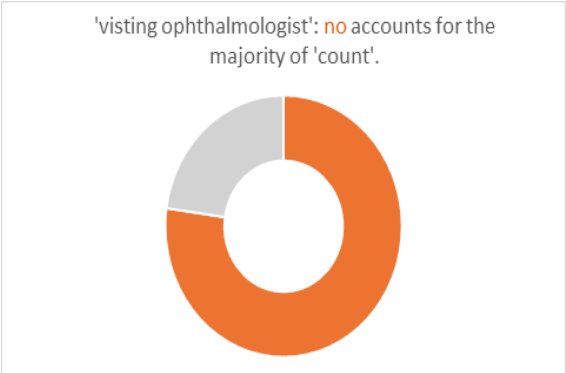

Figure 7: Distribution of subjects consulting ophthalmologist for the symptoms of DES

Of the 465 participants, 317 (68.17%) used digital devices for more than four hours a day, and 251 (79.17%) of these individuals experienced DES symptoms. Both of these parameters were statistically significant ($p<0.01$). 227 (48.81%) participants held their digital device at a distance of less than 33 cm, and 159 (70.04%) of these participants had DES symptoms.

382 (82.15%) of the participants spent more than four hours in an air-conditioned environment and 291 (76.78%) of them had symptomatic DES. Of the total participants, 127 (27.31%) used low contrast settings. Of these, 77 (60.62%) had symptomatic DES. There was statistical significance for both parameters with $p < 0.01$.

350 individuals, or 75.26 percent of the total, used both sitting and lying position when using digital devices.40.57 percent (142) of these have DES symptoms as shown in [Table 2].

283 participants, or 60.86% of the total, regularly underwent refractive correction. Of them, 37 (13.07%) had infrequent use of their optical aid, and 28 (75.67%) of them had DES symptoms. Furthermore, out of the 259 people who used spectacles, 165 (67.07%) used antiglare, and 26 (15.75%) of them had DES symptoms. Table 3 shows that both parameters had statistical significance, with $p<0.01$.

The results showed that only 24 out of the 283 participants who regularly used refractive correction were using contact lenses when using optical devices. Of these, 7 (or 50%) were frequent users, and all 7 (or 100%) had symptomatic DES. This difference was statistically significant at $p<0.01$.

Out of 293 students who had symptoms of DES, we found 57 subjects (19.45%) are using lubricating eye drops and 236 students (80.54 %) are not using any lubricating drops as shown in [Figure 8].

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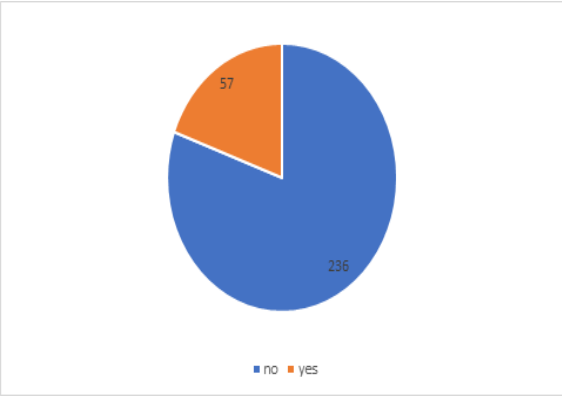

Figure 8: Distribution of subjects on the basis of using lubricating eye drops

Of the 465 participants, only 200(43.01%) were aware of 20/20/20 rule to reduce DES of which only 155 follow the rule regularly.This highlights the lack of knowledge and lacunae of knowledge in following proper practices for protection against DES.

Table 1: Gender & Digital eye strain severity score

Gender	Digital eye strain <6	Digital eye strain >6	Total
Male	130	126	256
Female	42	167	209
Total	172	293	465

Table 2: parameters pertaining to digital devices and Digital eye strain

Device related parameters	Response	Participants with Digital eye strain >6	Participants without Digital eye strain <6
Average hrs of use per day	>4 hours	251	66
	<4 hours	46	112
Distance of holding device	>33 cm	6	93
	33 cm	33	106
	< 33 cm	159	68
Contrast setting	Low	77	50
	Medium	48	257
	High	14	19
Posture while using device	Lying	14	45
	Sitting	9	47
	Both	142	208
Hrs spent in AC environment	<4 hours	33	50
	>4 hours	291	91

Table 3: Participants using habitual refractive correction and Digital eye strain with optical device-related parameters

Optical device related parameters	response	Participants with digital eye strain >6	Participants without Digital eye strain <6
Use of spectacle with power	Yes	87	172
	Sometimes	28	9
Use of contact lens	Yes	7	0
	Sometimes	7	10
Use of Anti-glare	Yes	26	139
	No	33	61

DISCUSSION

With the increasing use of computers and other digital devices by the current age, digital eye strain is becoming a global concern for eye health. With the introduction of online courses at educational institutions around the world, there was a surge in the use of digital gadgets. Eyestrain, headaches, impaired vision, dry eyes, and soreness in the neck and shoulders are among the most typical DES symptoms, according to the American Optometric Association.[6] Similar findings were found in our study, with participants reporting headache (54.62%) as the most frequent symptom, followed by tearing (54.8%) and burning sensation (54.62%).

A study on digital eye strain conducted in 2016,[7] indicated a prevalence of self-reported symptoms of 65%, which is equivalent to our study's prevalence of DES of 63.01 %. The identical study revealed that women (69%) were more affected than men (60%).[5,6] A similar finding was made by another study,[8] which found that among 250 office workers, women were more likely than men to experience DES symptoms. Similar results were seen in our study, with females (56.99%) being more impacted than males (43.00%), which may be related to gender differences in the prevalence of dry eyes.[9,10]

Hayes et al,[4] showed that symptoms of digital eye strain were much worse with longer computer use. Similar to our study, which found that participants who used their digital device for more than 4 hours per day had higher DES (79.17%) than people who used it for less than 4 hours per day (31.08%). According to the US National Institute for occupational Safety and Health, Computer vision syndrome affects about 90% of the people who spend 3 hours or more a day at a computer.[11]

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To assess the risk factors for developing digital eye strain, students were asked about the distance at which the digital device was kept. According to our study, individuals with smaller viewing distances (<33cm) reported more DES symptoms (70.04%), which is consistent with a 2016,[12] study's findings that the larger the viewing distance, the less reported eye strain. Time spent in air conditioning and contrast on digital gadgets were also assessed in our study. It was found that the incidence of DES was higher in participants who used low contrast (60.62%) and those who used air conditioning for more than four hours a day (76.78%).

The posture students adopted were both lying and sitting by 350 students in total (75.26%) with 142 students having digital eye strain symptoms. Fifty six (12.04%) students used digital device in sitting position whereas fifty-nine (12.68%) students used digital device in lying position. The posture of the students while using digital device was not significantly associated with DES in our study (P=0.08). This finding was consistent with the results of studies done by Ghufran A. Abu Dawood et al,[13] and Khola Nooren et al,[14] where they didn't find significant association between posture and CVS symptoms.

We investigated the effects of wearing glasses with or without antiglare and contact lens wear on factors related to optical correction. It was found that individuals who infrequently wore spectacles experienced a high frequency of DES (75.67%), whereas those who wore antiglare had a low percentage of symptomatic DES (15.75%). According to a 2016 study,[15] wearing contact lenses was linked to a higher incidence of DES (100%) and a higher prevalence of DES when using digital devices continuously.

A prospective community-based study will provide information about the true prevalence rate and factors that contribute to digital eye strain, especially if extended hours of using digital devices are necessary. The limitations of this research consisted of a self-report, anonymous survey. Only undergraduate medical students from a single Institute were allowed to participate, therefore an ophthalmic examination of the individuals was impossible, and the veracity of the data submitted could not be checked.

CONCLUSION

The risk of DES increases with the number of hours spent using a digital device, and it is more common in women. High contrast and a greater viewing distance both lessen the risk of acquiring DES, hence doing so is advised. Regular habitual refractive correction with antiglare is advised, but prolonged contact lens wear, particularly in an air-conditioned setting, should be avoided.

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