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Original article

Evaluating the Presence of Computer Vision Syndrome among Medical Students at Libyan International University through Symptom Analysis

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Abstract
Computer Vision Syndrome (CVS) is a group of eye and vision-related problems resulting from prolonged use of digital devices. With the increasing dependence on technology in education, especially among medical students, the prevalence of CVS has become a significant health concern. Understanding the prevalence and associated symptoms of CVS among medical students is essential for developing targeted preventive measures. The study aims to determine the prevalence of CVS among medical students at Libyan International University (LIU), and the commonly reported symptoms of CVS were examined. A cross-sectional survey was conducted among 250 medical students at LIU using a convenience sampling method. Data were collected via a self-administered English-language questionnaire. Out of 250 respondents, 109 were male, and 141 were female. The age groups ranged from 18 to 30 years. The study revealed that CVS neck or shoulder pain was the most common symptom (73.2%), followed by eye strain (72.8%), headaches (68%), blurred vision (60.8%), and itchy eyes (56%). This study concludes that students' symptoms were highly probable for CVS. The prevalence of symptoms such as neck or shoulder pain, eye strain, and headaches is high. The CVS score was significantly associated with gender, with females at higher risk.
Keywords: Computer Vision Syndrome, Medical Students, Prevalence, Libyan International University.

Introduction

Computer vision syndrome (CVS) refers to a collection of eye and vision-related problems that result from prolonged use of digital devices such as computers, tablets, smartphones, e-readers, and cell phones [1]. The prevalence of CVS has been steadily increasing as the use of digital devices in both work and study environments has grown. Globally, CVS affects a significant portion of the population, especially among students, office workers, and professionals who spend prolonged periods on screens. The prevalence of CVS in the pediatric and adult ranges from 12.1% to 94.8%, 35.2% to 97.3% globally, irrespective) [2].

One of the primary causes of CVS is extended use of digital devices, such as computers, tablets, and smartphones. Staring at screens for prolonged periods strains the eye muscles, leading to fatigue. Improper lighting conditions or excessive glare on digital screens can exacerbate eye strain, as the eyes need to work harder to focus. According to the American Optometric Association (2023), glare from screens or overhead lights contributes significantly to visual discomfort and CVS [3]. Sitting too close or too far from the screen, as well as poor ergonomics (such as not having the screen at eye level), can increase the likelihood of CVS. Inadequate posture often leads to neck and shoulder pain, which are common symptoms of CVS. Individuals with pre-existing vision issues, such as myopia, hyperopia, or astigmatism, who do not use corrective lenses may experience exacerbated symptoms of CVS. When focusing on a screen, the blink rate naturally decreases, leading to dry eyes and discomfort. Blinking is essential for keeping the eyes moist and refreshed. Screens with low refresh rates or high blue light emissions can increase the risk of eye strain and fatigue [3]. The clinical symptoms of CVS were a group of eye and vision-related problems, such as eye strain (Asthenopia), headache, blurred vision, dry eyes (Xerophthalmia), itchy or burning sensation in the Eyes, sensitivity to Light (Photophobia), and neck, shoulder, and back pain [4].

CVS can be diagnosed through a comprehensive eye examination, with a focus on visual requirements during computer or digital device use. The examination may include patient history, visual acuity measurements, refraction to determine lens power, and testing of eye focusing, movement, and coordination [5]. To treat CVS obtaining regular eye care and making changes in how the screen is viewed, individuals may benefit from glasses prescribed specifically for computer use, as general-purpose glasses may not provide optimal vision for viewing a computer screen, vision therapy, a structured program of visual activities, may be recommended to address eye focusing or coordination problems that cannot be adequately corrected with glasses or contact lenses and proper body positioning, lighting conditions, rest breaks, and blinking frequently can also help alleviate symptoms [6]. Preventing or reducing CVS involves controlling lighting and glare on the screen, establishing proper working distances and posture, ensuring any vision problems are corrected, and practicing regular eye examinations and proper viewing habits [7].

Several studies conducted globally have investigated the prevalence and impact of CVS among medical students, providing valuable insights into its widespread occurrence and associated risk factors. In Sudan Hassan G. et al. (2023) [8], Egypt (Mohammed Iqbal et al., 2021) [9], India (Logaraj et al., 2014) [10], (Darshan S.M et al., 2019) [11], in Jamaica, (Lizette Mowatt et al., 2017) [12]. Collectively, these studies demonstrate that CVS is a prevalent and pressing health issue among medical students worldwide. The consistent findings across different regions indicate that prolonged digital device use, a key aspect of modern

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education, significantly contributes to CVS Symptoms, necessitating targeted interventions to alleviate its impact.

Nearly two of the three participants had CVS. Being female, improper body posture, use of electronic devices outside work, lack of a break habit, long hours of visual display terminal use, short-distance screen use, and poor ergonomic practices were associated with increased odds of CVS [13]. The significant purpose of this study about CVS lies in understanding the impact of digital device use on visual health, academic performance, and overall well-being. Identifying affected populations and highlighting the association with demographic factors is crucial for developing preventive measures and management strategies, and raising awareness about the growing health issue. Although CVS is becoming a major public health problem, less emphasis is given, particularly in developing countries, and to our knowledge, there is no study about this problem in any university or school in Libya. There, our study aimed to assess the prevalence and determine the symptoms and risk factors of CVS among students at Libyan International University (LIU).

Methods

A cross-sectional study design was conducted among medical students in LIU, irrespective of age, gender, or academic year. The estimated sample size was 250, depending on the total number of medical students enrolled in the faculty in 2024, 700 students, and by using the Rao-soft sample size calculator by presuming a 95% confidence level, and a 5% margin of error.

A public online survey (Google Form) was used for voluntary response sampling. Data were collected using an English-language questionnaire that included demographic data and items to assess CVS symptoms. A questionnaire was sent to the students across LIU by sharing a link through popular social media groups and administered to participants in person. According to the CVS-Smart questionnaire (CVS-Smart), developed by Professor Mohammed Iqbal [14,15], the visual, ocular surface, and extraocular diagnostic criteria for CVS constituted the basic components of CVS-Smart. CVS-Smart is a novel, valid, reliable, subjective instrument for determining CVS diagnosis and prevalence, and may provide a tool for rapid periodic assessment and prognostication [9]. Students' symptoms (ocular and extraocular) were classified into no CVS, low, highly probable, and confirmed cases of CVS.

Data Analysis

Data was analyzed by using SPSS version 25, and descriptive analysis was conducted by prescribing frequency distribution and percentages for study variables, including participants' demographic data, associated CVS symptom frequency, and time spent on digital devices per day. Cross-tabulation to assess factors associated with CVS among study participants was carried out with the chi-square test for significance. All statistical tests used with P-values ≤ 0.05 were considered statistically significant.

Ethical Considerations

Participants had the freedom to choose whether they wanted to participate or not. Ethical approval was taken from the university's Research Ethics Committee.

Results

A total of 250 medical students from the LIU participated in the study. 109 students (43.6%) were male, and 141 students (56.4%) were female. Most students were between 18 and 23 years old, with 102 students (40.8%) in the 21-23 age group. Regarding the academic year distribution, students were mainly fourth-year, 56 (22.4%), and fifth-year, 61(24.4%) (Table 1).

Table 1: Distribution of students according to gender, age, and academic year.

Variable	No.	%
Gender		
Male	109	43.6
Female	141	56.4
Age		
18 – 20	94	37.6
21-23	102	40.8
24-26	50	20
> 26	4	1.6
Academic Year		
1st	46	18.4
2nd	43	17.2
3rd	44	17.6
4th	56	22.4
5th	61	24.4
Total	250	100

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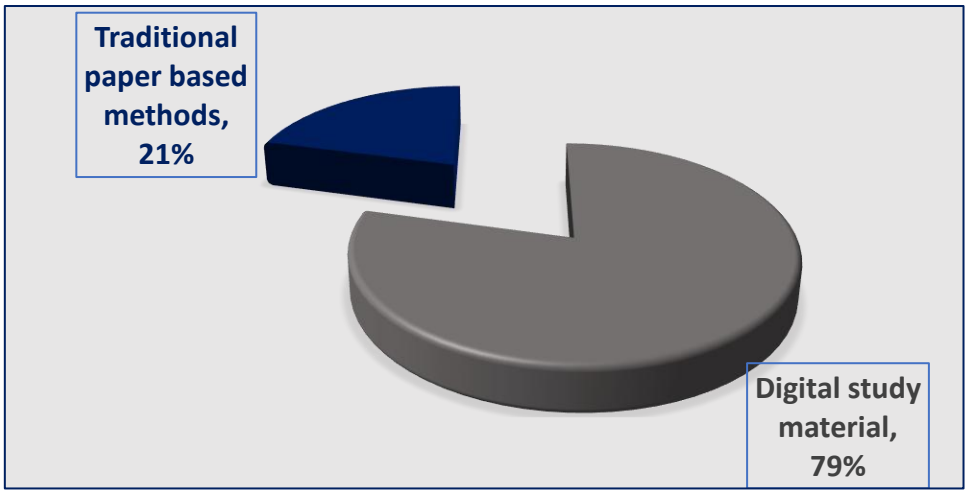
Regarding the time spent on digital devices, the majority, 186 (74.4%) of students spent about 4 to 9 hours per day. (Table 2).

Table 2: Frequency and percentage of medical students based on time spent on Digital Devices per day

Hours / Day	No.	%
1-3 hrs	36	14.4
4-6 hrs	76	30.4
7-9 hrs	110	44.0
≥10 hrs	28	11.2
Total	250	100

The study reported that the electronic study method was overwhelmingly favored, with 198 students (79.2%) preferring digital study materials, while 52 students (20.8%) preferred traditional paper-based methods, as illustrated in Figure 1.



Symptoms of Computer Vision Syndrome

The study reported that the most common CVS symptoms among students were, 183 (73.2%), neck or shoulder pain, 182 (72.8%), eye strain, 170 (68%) headaches. 152 (60.8%) had blurred vision, 140 (56%) with itchy eyes. (Figure 2).

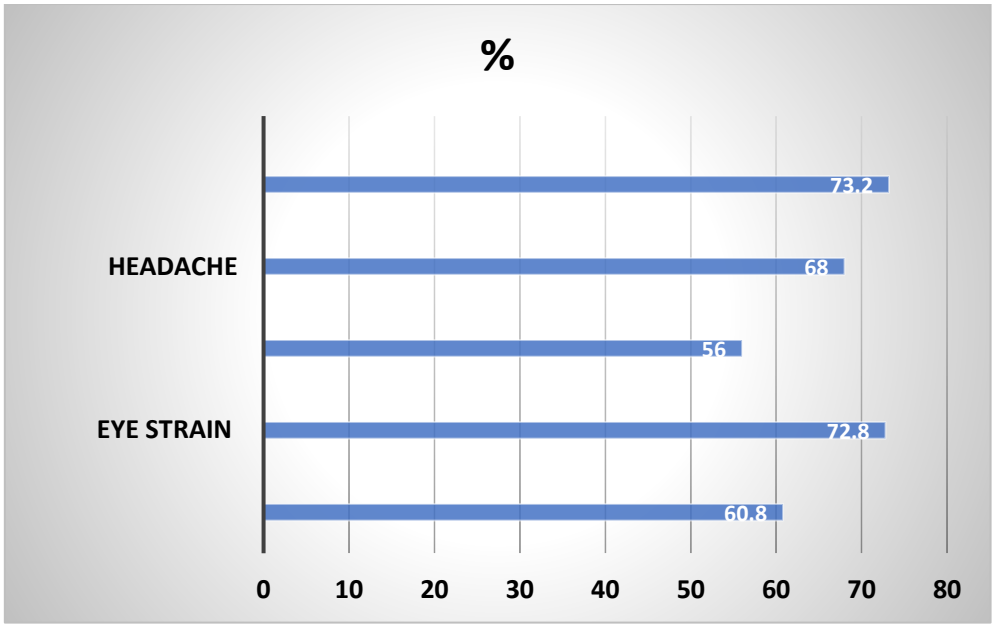


Figure 2: Distribution of students according to their symptoms.

According to the criteria for CVS diagnosis, 83 students (33.2%) had highly probable CVS, but no student had a confirmed case. (Table 3)

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Table 3: Distribution of students according to their CVS score

Variable	No.	%
No CVS	77	30.8
Low Probable CVS	90	36.0
Highly Probable CVS	83	33.2
Total	250	100

When studying the association of CVS score with students' age, gender, academic year, and time spent on digital devices, the study revealed that no significant statistical association was reported between the CVS score and age (p=0.44), academic year (p=0.12), and time spent on devices per day (p = 0.099). The analysis indicates that there is a significant difference in the prevalence of CVS between males and females. Specifically, females tend to experience a higher incidence of CVS compared to males. The statistical test yields a p-value of 0.021, which is below the commonly accepted significance level of 0.05, suggesting that the observed difference is unlikely due to chance. Therefore, it can be concluded that gender is associated with differing rates of CVS, with females being more affected than males in the studied population (Table 4).

Table 4: Association of student characteristics with CVS score.

		No CVS		Low Probability		Highly Probability		
		No.	**%**	**No.**	**%**	**No.**	**%**	**P value**
Age/Years	18-20	28	36.4	36	40	30	36.1	0.440
	21-23	29	37.7	33	36.7	40	48.2	
	24-26	18	23.4	20	22.2	12	14.5	
	> 26	2	2.6	1	1.1	1	1.2	
Gender	Male	53	68.8	43	47.8	45	54.2	0.021
	Female	24	31.2	47	52.2	38	45.8	
Academic Year	1st	14	18.2	20	22.2	12	14.5	0.123
	2nd	9	11.7	15	16.7	19	22.9	
	3rd	16	20.8	17	18.9	11	13.3	
	4th	15	19.5	15	16.7	26	13.3	
	5th	23	29.9	23	25.6	15	18.1	
Time/hrs. spent/day	1-3	18	23.4	8	8.9	10	12.0	0.099
	4-6	23	29.9	31	34.4	22	26.5	
	7-9	29	37.7	38	42.2	43	51.8	
	≥ 10	7	9.1	13	14.4	8	9.6	

Discussion

This study was conducted among 250 medical students to assess the diagnosis of CVS according to specific criteria, including in the valid questionnaire by Iqbal M 2021, that clarified whether the students were affected or not [15]. CVS can be due to ocular and/or extra-ocular (ergonomic) etiologies [16]. The student had a symptom as a result of spending long hours using computers studying; however, the current study reported that 30.4% of the students spent four to six hours a day, which is slightly less than in the previous study in Libya done by Alturaiki HM, 36.9% [17].

Our study shows that extra - ocular symptoms such as neck or shoulder pain (73.2%) and ocular symptoms eye strain (72.8%) are the most common symptoms, these findings are consistent with the results from a university in Jamaica, where neck pain (75.1%), eye strain (67%), and shoulder pain (65.5%) were among the most frequently reported symptoms [12]. While another study 48.5% presented with neck, shoulder, or back pain, 39.9% dryness of eyes & 36.9% blurred vision [11]. Moreover, the previous study done in the Eastern Region of Libya found that back pain (79%), neck pain (74%), shoulder pain (65%), and 52.3% experienced eye pain were the most frequently reported [17]. An Egyptian study reported that the most common visual, ocular surface, and extra-ocular complaints were eye strain, neck/shoulder/back pain in 74.50%, 58.27% and 80.52% respectively [14]. In addition, our study reported that 68% of students had a headache, which is similar to the United Arab Emirates (53.3%) [18], while less than in previous studies done in the Eastern Region of Libya, 82% and in some studies considered extra-ocular symptoms such as headache (91%) [17]. This study revealed that 60.8% reported having blurred vision, while in another study, the most frequently reported symptoms to diagnose CVS among the studies were blurring of vision (92%) [2]. The least reported symptoms in current study showed that 56% of students experienced itchy eyes nearby the previous Libyan study that 64% of students experienced itching eyes [17]. The current study reported that 74.4% of students spent about 4 to 9 hours per day using digital devices, which is more than

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the percentage in other studies (33%). Individuals used computers around 4-6 hours per day [11]. While another study 59.8% of participants came out to be more than 6 hours/day on average [19].
The analysis indicates that there is a significant difference in the incidence of CVS symptoms between males and females. Specifically, females tend to experience a higher incidence of CVS compared to males. The statistical test yields a p-value of 0.021, which is below the commonly accepted significance level of 0.05, suggesting that the observed difference is unlikely due to chance. Therefore, it can be concluded that gender is associated with differing rates of CVS, with females being more affected than males in the studied population. On the contrary, gender is not strongly related to CVS in a previous study done in Libya [17]. While it is similar to the Egyptian study reported that females have a higher prevalence of CVS than males [14]. In comparison, another study reported that no distinct gender-based pattern was detected in the incidence of symptoms [20]. In the United Arab Emirates, a study revealed that female students were found to be at a higher risk of CVS, had significantly higher incidence of headaches and blurred vision than males [18]. However, the students' age, academic year showed no statistical association ($p = 0.44$, 0.12, respectively). In contrast, a statistically significant association between age and the development of CVS was found in the Libyan study [17]. In the current study, the time spent per day had no statistical association (p value 0.099), which, in contrast with the study done in Egypt, revealed that CVS was significantly associated with increased screen-hours, including >2 screen-hours daily ($P<0.0001$) [9].

Conclusion

This study concludes that students' symptoms were highly probable for CVS. The prevalence of symptoms such as neck or shoulder pain, eye strain, and headaches is high. The score associated with gender; females are at risk of CVS. Medical students should be educated about CVS, its symptoms, and preventive strategies. Workshops and seminars on proper screen use, ergonomics, and breaks between screen sessions can help mitigate symptoms.

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Conflicts of Interest
The authors declare no conflicts of interest

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