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ORIGINAL ARTICLE

Risk Factors of Computer Vision Syndrome and its Prevention

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ABSTRACT

Background: The 21st century is thought to need these gadgets. They are employed in households, as well as in recreational settings and educational organizations, in addition to workplaces and businesses. The term "video display terminal" is used to refer to a computer screen (VDT). It includes computers, tablets, e-readers, smartphones, and other electronic gadgets. According to estimates, 45 million employees use computers directly by gazing at VDTs nonstop for long periods.

Aim: The goal of this study was to count how many CMT (college of Medical Technology) students have computer vision syndrome and to identify the risk factors that go along with it.

Methods: This cross-sectional research was conducted on 198 CMT students at Pakistan institute of Medical Sciences, Islamabad, Pakistan, from 1st April 2022, to 30th September, 2022. The research covered all students between the ages of 17 and 25 who had used a computer in the month before the programs start date. Those students who were using eye medications, those with underlying systemic conditions like diabetes or hypertension, those with pre-existing eye problems, and those who did not provide informed written permission were excluded from the study. To demonstrate relationships between categorical data, the chi-square test was performed. The SPSS version 23 was used to analyze the data.

Results: Age of 20.16 ± 3.81 years on average. Out of 198 respondents, 133 (67.2%) said they had at least one of the following symptoms of computer vision syndrome: headache, eye tiredness, burning, eye irritation, neck discomfort, and shoulder pain. Computer users' eye complaints included eye irritability (48%), burning (33%), and eye weariness (15%). Extraocular symptoms range from headaches (38%) to neck and shoulder discomfort (21.8%). Computer use time (240 minutes/four hours) was substantially correlated with eye tiredness and headache.

Practical Implication: The benefit of this study is to identify the risk variables linked with computer vision syndrome and its incidence among undergraduate medical students. It will aid in raising public awareness of the health risks associated with computers and other digital electronic devices, as well as assisting public health experts and other stakeholders in taking action to address this public health problem

Conclusions: The ailment known as "Computer Vision Syndrome" affects a lot of young students who use computer regularly

Keywords: Computer Vision Syndrome, Risk, Prevention, households, irritability, pain, eye tiredness, .

INTRODUCTION

Modern technology has made the usage of gadgets and computers practically necessary in many facets of life. The 21st century is thought to need these gadgets. They are employed in households, as well as in recreational settings and educational organizations, in addition to workplaces and businesses. (1) The term "video display terminal" is used to refer to a computer screen (VDT). It includes computers, tablets, e-readers, smartphones, and other electronic gadgets. According to estimates, 45 million employees use computers directly by gazing at VDTs nonstop for long periods. (2) There is no denying that the introduction of contemporary technology has transformed the globe and helped society as a whole since, to a greater or lesser degree, these technologies are important sources of knowledge and are readily available. (3) According to records, 75% of all everyday activities include using a computer. (4) Computer-related health issues have rapidly increased in the current era of prolonged and widespread computer use. A visual and ergonomic illness known as "Computer Vision Syndrome" has been linked to extended exposure to VDTs (CVS). (5)

Computer vision syndrome is described by the American Optometric Association as "a complex of eye and vision disorders connected to activities that stress the near vision and that are experienced in connection to or during the usage of computer." (6) Redness, dry eyes, a burning feeling, and blurred vision are the most often reported visual problems. Muscular stiffness, neck discomfort, headaches, and finger numbness are a few ergonomic issues related to computer usage. (7) Asthenopic symptoms which include eye strain and sore eyes (B) ocular surface-related symptoms including watering, irritation, and dry eyes (C) Visual symptoms that include focus change slowness, blurred vision, and double vision (D) extra-ocular symptoms such as shoulder, neck, and back discomfort. (8)

In the US, more than 143 million individuals use computers daily. (9) Over the last several decades, the South Asian area has seen remarkable socioeconomic and technical progress. Due to the fast growth of science and technology, computers are now a necessary component of daily life. Overuse of technology has increased the incidence of CVS, which has reduced productivity and negatively impacted quality of life. Sadly, there is a paucity of literature and little research accessible in this area. There isn't a nationwide representative survey, and the studies that have been done are small-scale and mostly centered at a single institution. (10)

CVS is an increasing public health concern that dramatically lowers workplace productivity and quality of life. Nearly 14% of patients seek eye examinations due to computer vision syndrome, according to a survey by the American Optometric Association, and many affected are unaware that they have this illness. (11) The goal of this research is to identify the risk variables linked with computer vision syndrome and its incidence among undergraduate medical students. It will aid in raising public awareness of the health risks associated with computers and other digital electronic devices, as well as assisting public health experts and other stakeholders in taking action to address this public health problem.

MATERIAL AND METHODS

The design of this study was a cross-sectional study design. This research was conducted on 198 CMT students at Pakistan institute of Medical Sciences, Islamabad, Pakistan, from 1st April 2022, to 30th September, 2022. Using non-probability convenience sampling technique, study participants were chosen. When the prevalence of the syndrome of computer vision was assumed to be 80% and the margin of error to be 5%, an estimated sample size of 245 was discovered. The research covered all students between the ages of 17 and 25 who had used a computer during the month before the programmes start date. Students who used drugs that negatively impacted their vision, such as anti-tuberculosis medications, steroids, and immunosuppressants, as well as those with underlying systemic disorders including diabetes and

hypertension, as well as those with pre-existing ocular conditions, were excluded from the research. To demonstrate relationships between categorical data, the chi-square test was performed. The SPSS version 23 was used to analyze the data.

The diagnostic criteria for computer vision syndrome included all students who had computer vision syndrome symptoms for at least one week in the preceding six months, whether intermittently or constantly. The symptoms of CVS include eye discomfort, eye tiredness, burning sensations, headaches, and shoulder and neck pain. The participants were polled using a pre-tested structured questionnaire that asked about their basic demographic information, time spent using a video display terminal, proximity to the screen, symptoms felt after staring at it, how often they took breaks while using computers, symptoms made worse by posture, and possible risk factors when using it. The questionnaire was created after a consultant ophthalmologist's professional judgment on CVS and was modified from literature research for a prior study. Before the research began, we obtained each participant's informed written permission.

RESULTS

Total enrollment in the trial was 250 participants. 212 survey responses were received. The incompleteness of 14 of them led to their disposal. Finally, 198 participants—31% males and 69% females—were included in the research at the end. The average age, which is 20.16 ± 3.81 years, falls between the ages of 17 and 25. 133 respondents (67.2%) out of the 198 who took the survey said they had at least one symptom of computer vision syndrome. Ocular and non-ocular or muscular-skeletal issues are the two broad categories into which computer-related complaints are divided. Out of 133 (67.2%) students who were impacted, 28 (55%) had ocular complaints, and 6 (12%) had additional ocular complaints like headaches and musculoskeletal issues.

According to the study's frequency distribution of ocular morbidities, eye irritation affected 48% (95) of people, searing discomfort affected 33% (65) of people, and eye weariness affected 15% (30) of people (Figure 1). Extraocular complaints range from headaches 38% (75)) and neck-shoulder pain 21.8% (43). (Fig. 2).

64.36% of students who used computers for more than 4 hours (240 min) had CVS symptoms, compared to 34.4% of participants who used computers for less than 4 hours (240 min) (p-value = 0.003). Similar results were observed when a correlation between CVS symptoms and the amount of time spent using a mobile phone was discovered (p-value = 0.012). The use of a laptop or phone for longer than 240 minutes or four hours was significantly associated (p-value < 0.05) with headache and eye fatigue. Table 1 provides details.

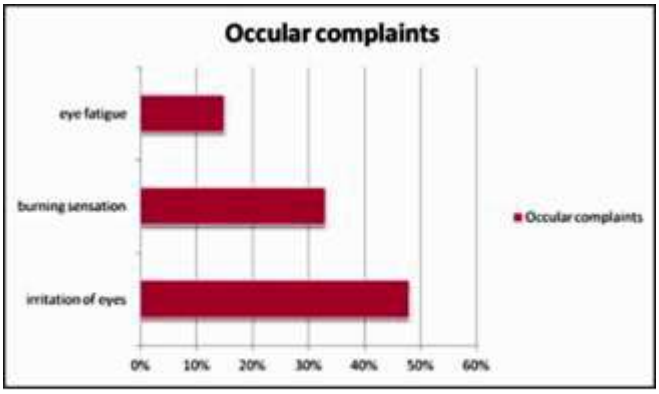

Fig. 1: Frequency of ocular complaints in students.

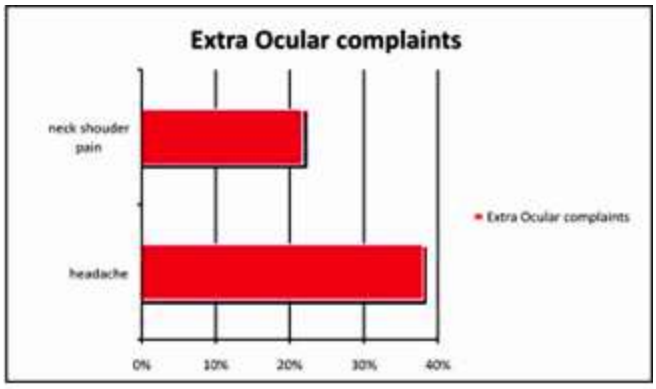

Fig. 2: Frequency of Extra ocular complaints in student.

Table 1: Computer usage association with CVS symptoms.

	Variables	Distance from Cell Phone			Distance from Laptop/ Desktop		Phone time		Laptop time	
	Group	< 12 inches	12 – 16 inches	> 16 inches	< forearm length	> forearm length	≤ 4 Hours	>4 Hours	≤ 4 Hours	>4 Hours
Eyes Irritation	N	12	8	5	50	46	11	15	14	9
	%	6.1	4.2	2.5	25.2	23.2	5.5	7.5	7.07	4.5
	p-value	0.808			0.628		0.852		0.554	
Shoulder/Pain	N	31	24	6	36	29	34	44	37	28
	%	15.7	12.1	3.03	18.1	14.6	17.7	22.1	18.6	14.1
	p-value	0.903			0.255		0.412		0.489	
Headache	N	43	35	33	39	31	30	90	18	69
	%	21.7	17.6	16.6	19.6	15.6	15.15	45.45	9.1	34.8
	p-value	0.068			0.997		0.026		0.031	
Eye Fatigue	N	30	19	4	29	24	23	71	68	127
	%	15.1	9.59	2.07	14.6	12.1	11.6	35.8	34.4	64.3
	p-value	0.775			0.841		0.012		0.003	

Table 2: Computer usage pattern with CVS symptoms.

		Frequency of Breaks		Symptoms aggravated by improper		Posture		
		>60 min	≤ 60 min	No	Yes	Sitting/Lying both	Mostly lying	Mostly Sitting
Irritation of eyes	n	15	17	13	18	2	4	3
	%	14.5	8.3	6.5	9.1	1.1	2.2	1.5

	P	0.74		0.147		0.898		
Neck/Shoulder pain	n	41	46	39	41	12	42	64
	%	20.7	23.2	19.7	20.7	6.06	21.2	32.2
	p	0.679		0.053		0.003		
Headache	n	49	52	41	53	15	35	55
	%	24.7	26.2	20.7	26.7	7.57	17.6	27.7
	p	0.911		0.082		0.006		
Eye fatigue	n	38	40	35	39	14	19	17
	%	19.1	20.2	17.6	19.8	7.07	9.59	8.58
	p	0.064		0.155		0.283		

35% of the students reported having a headache while lying down, 55% while sitting, and 15% while using both methods (p-value = 0.006). Significantly, 55% using computers while seated get headaches. In a similar vein, 64% of students reported experiencing neck and shoulder discomfort in a sitting posture as opposed to 42% in a laying position and 12% in both (p-value = 0.003). Table 2 provides specifics.

Less frequent breaks make CVS symptoms worse. There was no discernible correlation between the number of breaks and CVS symptoms. However, after lengthening the break periods, all computer vision sickness symptoms go better. Table 2 provides details.

DISCUSSIONS

The incidence of computer vision syndrome was determined to be 67% in the current investigation, which was done on medical students at a university. In comparison to our study, a study done on Chennai medical students found a high prevalence of 78.6% (12). All symptoms, even those that were fleeting, were deemed to fit the criteria for CVS in this analysis, but in our investigation, only symptoms that lasted at least one month were taken into account. This difference may have led to an overestimation of the prevalence in the prior study (13). In contrast to our study, which found 89.9% of Malaysian university students had CVS, other studies have found higher rates of the disease. According to a study done in Nigeria, the prevalence was 74%. In our study, eye irritation was the most common ocular complaint, followed by burning sensation (33%), eye fatigue (15%), and eye fatigue (48%). (14)

In contrast, headaches were the most frequent extra-ocular symptoms (38%) followed by neck and shoulder pain (21%). In a study conducted in Iran, eye pain was the most common ocular issue (41%) followed by excessive watering (18%), burning, and itching in the eyes (15%). 38% of students reported headaches and 19% reported shoulder pain as extra ocular symptoms. Headache and neck/shoulder pain were both reported by 41% and 21% of participants in our study, respectively. Extraocular symptoms were consistent with our research. (15)

In our study, 33% of students reported experiencing a burning sensation, which is comparable to a previous study where 32% of medical students reported experiencing a burning sensation. (16) According to another study c, only 28.9% of the participants reported experiencing a burning sensation, which is a relatively low prevalence. (17) In contrast, a study of call center employees found that 54.6% of them reported having a burning sensation, indicating a high prevalence of the condition. (18)

The length of time spent using a computer is directly related to eye symptoms; longer sessions often lead to complaints that persist even after the work is completed. In our study, we discovered a direct relationship between computer use time (including time on a laptop and a mobile device) and computer vision syndrome symptoms. Visual symptoms have been discovered to be significantly linked with computer usage times longer than 4 hours (240 minutes). A statistically significant correlation between headache and eye fatigue was found.

According to a related study, the number of hours spent on the computer increased the severity of the visual symptoms. (19) According to a different study, using a computer for longer than 7 hours is significantly linked to CVS21 symptoms. In accordance with our study's findings, a different study also found that people who use computers for longer than six hours are more likely to experience ocular symptoms like eye strain, itching, and burning. (20) While a study found that people who use computers for more than 8 hours a day are more likely to experience CVS symptoms. (21)

In our study, participants who take breaks report having symptoms less frequently, but there was no statistically significant link between the frequency of breaks and symptom relief. Recent studies have confirmed the notion that taking a break does not alleviate CVS symptoms. (22) Contrarily, several studies have shown that the visual symptoms of CVS worsen when no breaks are taken. (23) Studies that have been done on the subject show that poor posture when sitting might increase musculoskeletal complaints. (24) Our research accurately outlined this public health concern and pinpointed the risk factors for computer vision sickness. Our research does have certain restrictions, however. The cross-sectional nature of the research restricts the identification of a causal relationship between the identified risk variables and CVS. It was single-centered research in which participants reported their own CVS symptoms. Future investigations should be planned with follow-ups to establish the causal conclusion. It is advised to adhere to the 20/20/20 rule to lessen computer vision issues. The 20/20/20 rule recommends sitting 20 feet away and taking a 20-minute break after 20 minutes of computer use.

CONCLUSIONS

According to this study's findings, computer vision syndrome affects CMT students quite frequently. Our study clearly shows that computer-related health issues have grown to be a major public health concern. To educate the public about the harmful effects of computer use on health, awareness lectures must be held immediately. To educate the younger generation about the health risks associated with computer use, academic institutions should host health awareness lectures. To develop effective strategies to stop this issue, it is necessary to integrate all interested parties into this multidisciplinary task. To implement preventive measures and ergonomics effectively, all relevant authorities should work together. To prevent complications and reduce disability, regular monitoring and medical exams should be scheduled.

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