Original Article

Prevalence of Computer Vision Syndrome and Its Associated Risk Factors among Under Graduate Medical Students

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Purpose: To determine the prevalence of computer vision syndrome and its associated risk factors among undergraduate medical students.

Study Design: Descriptive Cross – sectional study.

Place and Duration of Study: Bahria University Medical and Dental, Karachi, Pakistan from 15th January, 2016 to 15th July 2016.

Material and Methods: This institution based cross sectional study was carried out on 198 undergraduate medical students of Bahria University Medical and Dental, Karachi, Pakistan. All the students within age group 17-25 years and who have used computer in 1 month preceding the date of the study were included in the study. Students who were using medication that affect visual health, diagnosed with underlying systemic disease like Diabetes, Hypertension, having preexisting eye diseases and those who do not give inform written consent were excluded from study. Chi-square test was used to prove associations between categorical variables. Data was analyzed using the standard statistical software packages (V 21)

Results: Mean age of 20.16 ± 3.81 years. Out of 198 respondents 133 (67.2%) claimed that they have experienced at least (headache, eye fatigue, burning sensation, eye irritation, neck shoulder pain) related to Computer vision syndrome. Ocular symptoms of computer user ranged from eye irritation (48%), burning sensation (33%), eye fatigue (15%). Extra ocular complaints include neck shoulder pain (21.8%) to headache (38%) problems. Eye fatigue and headache was significantly associated with computer usage time (240 min/ 4 hrs).

Conclusion: Computer vision syndrome is a very frequent condition among undergraduate medical students.

Key words: computer vision syndrome, prevalence, ocular complaints, extra ocular symptoms

With the advent of modern technology use of computer devices and gadgets has almost become indispensible in every aspect of life. These devices are considered as necessity of 21st century. They are not only being used at work places offices, academic institutions but there usage is also very much common even at recreational places and homes[1].

A computer screen is commonly known as Video Display Terminal (VDT). Computers, tablets, e-readers, smart phones and other electronic devices are included in it. It is estimated that approximately 45 million workers directly use computers by staring into VDTs for hours continuously[2]. No doubt the advent of modern technology has revolutionized the world and benefited the society as these devices are

indispensable source of information to greater extent and these are easy accessible and available[3]. It has been documented that 75% of all the daily activities involves the use of computer[4].

In the present era of prolong and rampant computer usage, there has been rapid upsurge in computer related health problems. Prolonged exposure to VDTs has been the cause of a visual and ergonomic disorder called "Computer Vision Syndrome" (CVS).[5]

American Optometric Association defined computer vision syndrome as "a complex of eye and vision problems related to activities, which stress the near vision and which are experienced in relation or during the use of computer"[6].

Visual problems are reported to be most frequently occurring health problem associated with excessive computer usage. Most commonly reported visual complaints include redness, dry eyes, burning sensation and blurring of vision. Ergonomic problems associated with computer use include muscular stiffness, cervical pain, headache, numbness of the fingers[7].

Symptoms of computer vision syndrome are broadly classified into four categories: i) asthenopic – sore eyes, eye strain, (ii) ocular surface related- dry eye, irritation, watering, (iii) visual – double vision, blurred vision, slowness of focus change iv) extra ocular – shoulder pain, neck pain, back ache[8].

Globally, nearly 60 million people are suffering from CVS and approximately million new cases occur every year[9]. In United states more than 143 million people work on computer everyday[10].

South Asian region has undergone rapid socioeconomic and technological development for past few decades. Owning to rapid advancement in science and technology, computer has become integral part of everyday life. Excessive use of technology has lead to increase prevalence of CVS with resultant loss of productivity and hampered quality of life. But unfortunately there is dearth of literature and only few studies are available in this regard. There is no national representative survey and available literature is of the studies conducted on small scale and mostly single institutional based[11].

CVS is growing public health issue and contributing significantly towards reducing quality of life and productivity at work place. According to report of American Optometric Association, nearly 14% of patients report for ocular examination because of computer vision syndrome and such effected individuals are not even aware that they are suffering from this condition[12].

The objective of this study is to determine the prevalence of computer vision syndrome and its associated risk factors among undergraduate medical students. It will help the public health professionals and all the stakeholders to take measures to reduce this public health issue and help to create awareness among public regarding health hazards of computers and digital electronic devices.

MATERIAL AND METHODS

This institution based cross sectional study was carried out from 15th January to 15th July, 2016 on undergraduate medical students of Bahria University Medical and Dental College, Karachi. Study participants were enrolled by non-probability convenience sampling. Sample size was calculated by taking the prevalence of computer vision syndrome as 80%[13], margin of error 5%, estimated sample was found to be 245.

All the students within age group 17-25 years and those who have used computer in 1 month preceding the date of the study were included in the study. Students who were using medication that affect visual health like (anti tuberculosis treatment, steroids and immunosuppressant), those diagnosed with underlying systemic disease like Diabetes, Hypertension, having preexisting eye diseases and those who do not give informed written consent were excluded from study. Chi-square test was used to prove associations between categorical variables. Data was analyzed using the standard statistical software packages.

All those students having the symptoms of computer vision syndrome either intermittently or continuously for at least one week during last six months were included in the diagnostic criteria of computer vision syndrome.

The CVS related symptoms include irritation of eyes, eye fatigue, burning sensation, and headache and neck shoulder pain.

The participants were surveyed using a pre-tested structured questionnaire, which included the basic demographic profile, time spend on video display terminal, distance from screen, symptoms experienced after viewing screen, frequency of break while

working on computers, symptoms aggravated by posture and potential risk factors during its usage. Questionnaire was prepared after expert opinion regarding CVS from consultant ophthalmologist and adapted from the literature research on previous study[2,4,8].

Informed written consent was taken from every participant before study. Study approval was taken from institution ethical review committee of Bahria University Medical and Dental College.

RESULTS

Overall, 245 Participants were enrolled in study. 212 questionnaires were returned. 14 were discarded because they were filled incompletely. Finally, at the end of study 198 participants (69% females and 31% males) were included in study. The age range between 17 to 25 years with mean age of 20.16 ± 3.81 years. Out of 198 respondents 133 (67.2%) claimed that they have experienced at least one symptoms related to Computer vision syndrome.

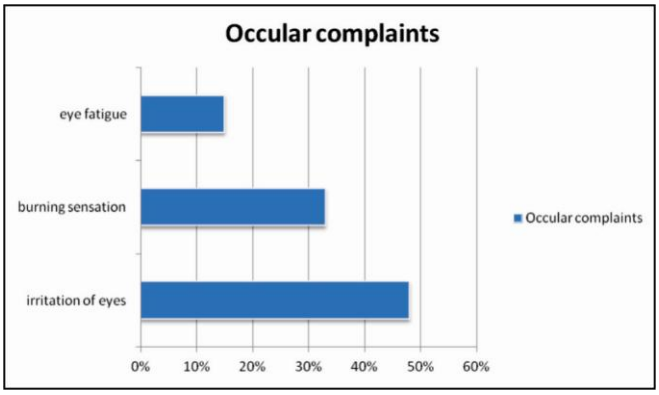

Fig. 1: Frequency of ocular complaints in students.

Complaints associated with computer usage are broadly categorized into two categories, ocular and non ocular or muscular skeletal problems. Out 133 (67.2%) affected, 28 students (55%) experienced ocular complaints while 6 students (12%) were having extra ocular complaints including headache and musculoskeletal problems.

The frequency distribution of ocular morbidities in the study include 95 (48%) irritation of eyes, 65 (33%) burning sensation and 30 (15%) experience eye fatigue (Figure 1). Extra ocular complaints range from neck shoulder pain 43 (21.8%) to headache 75 (38%) problems (Fig. 2).

CVS symptoms were commonly observed among the students 64.36% who used computers for more than 4 hours (240 min) as compared to 34.4% of participants who spend less than 4 hours (240 min) ($p = 0.003$) Similar trend was seen on finding association between CVS symptoms and duration of mobile phone usage time ($p = 0.012$). Significant association was seen for laptop and phone usage time (> 240 min/4 hours) with eye fatigue and headache ($p < 0.05$). Details are shown in Table 1.

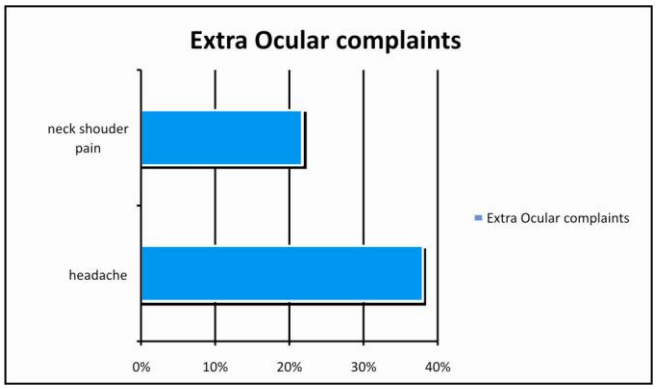

Fig. 2: Frequency of Extra ocular complaints in student.

Headache was experienced by 35% of the students in lying position, 55% in sitting and in 15% using both method ($p = 0.006$). Headache significantly occurs in 55% students using computer in sitting position. Similarly, neck shoulder pain is also more commonly observed in 64% of students in sitting position as compared to 42% in lying and 12% in both sitting and lying position ($p = 0.003$). Details are mentioned in Table 2.

Symptoms of CVS get worsen with less frequent breaks. There was no significant association of CVS symptoms with frequency of breaks. However, all the symptoms associated with computer vision syndrome improve after increasing the intervals of break. Details are shown in Table 2.

DISCUSSION

The present study was conducted on the medical students of university and prevalence of computer vision syndrome was found to be 67%. Study conducted on Medical students of Chennai reported high prevalence as compared to our study as 78.6%[13].

Table 1: Association of computer usage with symptoms of computer vision syndrome.

Variables	Group	Eye Fatigue		Headache		Neck/Shoulder Pain		Irritation of Eyes	
		n/(%)	p	n/(%)	P	n/(%)	p	n/(%)	p
Laptop time	≤ 240 min	68/(34.4)	0.003	18/(9.1)	0.031	37/(18.6)	0.489	14/(7.07)	0.554
	>240 min	127/(64.3)		69/(34.8)		28/(14.1)		9/(4.5)	
Phone time	≤ 240 min	23/(11.6)	0.012	30/(15.15)	0.026	34/(17.7)	0.412	11/(5.5)	0.852
	>240 min	71/(35.8)		90/(45.45)		44/(22.1)		15/(7.5)	
Distance from Desktop/ Laptop	< forearm length	29/(14.6)	0.841	39/(19.6)	0.997	36/(18.1)	0.255	50/(25.2)	0.628
	> forearm length	24/(12.1)		31/(15.6)		29/(14.6)		46/(23.2)	
Distance from Mobile Phone	< 12 inches	30/(15.1)	0.775	43/(21.7)	0.068	31/(15.7)	0.903	12/(6.1)	0.808
	12 – 16 inches	19/(9.59)		35/(17.6)		24/(12.1)		8/(4.2)	
	> 16 inches	4/(2.07)		33/(16.6)		6/(3.03)		5/(2.5)	

Table 2: Pattern of computer usage with symptoms of computer vision syndrome.

Variable	Groups	Eye fatigue		Headache		Neck/Shoulder pain		Irritation of eyes	
		n/%	p	n/%	p	n/%	p	n/%	P
Posture	Mostly Sitting	17/(8.58)	0.283	55/(27.7)	0.006	64/(32.2)	0.003	3/(1.50)	0.898
	Mostly lying	19/(9.59)		35/(17.6)		42/(21.20)		4/(2.2)	
	Sitting/Lying both	14/(7.07)		15/(7.57)		12/(6.06)		2/(1.1)	
Symptoms aggravated by improper illumination	Yes	39/(19.8)	0.155	53/(26.7)	0.082	41/(20.7)	0.053	18/(9.1)	0.147
	No	35/(17.6)		41/(20.7)		39/(19.7)		13/(6.5)	
Frequency of Breaks	≤ 60 min	40/(20.2)	0.064	52/(26.2)	0.911	46/(23.2)	0.679	17/(8.3)	0.740
	>60 min	38/(19.1)		49/(24.7)		41/(20.7)		15/(14.5)	

In this study all the symptoms even transient one were considered to meet the criteria of CVS while in our study symptoms lasting for at least one month duration were considered this can be reason for overestimation of prevalence in former study.

Study conducted on university students of Malaysia reported high prevalence of CVS as compared to our study 89.9%[14]. Study conducted in Nigeria reported the prevalence as 74%[15].

In our study most frequent ocular complaint reported was 48% irritation of eyes, then burning sensation 33% followed by eye fatigue 15%.While in extra ocular symptoms , most common symptom was headache (38%) then neck shoulder pain was experienced by 21% individual. In study carried out in Iran, most frequent ocular problem was pain in eyes

(41%) then excessive watering (18%) followed by then burning and itching in eyes (15%). In extra ocular symptoms, 38% students suffered headache and 19% shoulder pain. In our study headache was reported by 41% and neck shoulder pain was experienced by 21% participants[16]. Extra ocular symptoms were in accordance to our study.

In our study, burning sensation was reported by 33% students this is in accordance to the study conducted in India where burning sensation was experienced by 32% medical students[17]. Another study conducted in India by Talwar et al reported relatively low prevalence of burning sensation as it was experienced by 28.9% of the participants[18]. While in contrast study conducted among call center workers report high prevalence of burning sensation as it was experienced by 54.6%[19].

The duration of computer work is directly related to eye symptoms, longer duration tends to result in long-lasting complaints even after the work is finished. In our study duration of computer work (both mobile phone and laptop time is found to be directly associated with symptoms of computer vision syndrome. Computer usage time more than 4 hour (240 minutes) is found to be significantly associated with visual symptoms. Statistical significant association was observed for headache and eye fatigue.

Study conducted by Shrivastava et al also reported that the visual symptoms aggravated with increase duration of hours spend on computer[20] Rahman and Sanip in their study documented that more than 7 hours of computer usage is significantly associated with symptoms of CVS[21]. Another study done in India reported the results in accordance with our study in which the ocular symptoms including eye strain itching and burning are more common in computer users more than 6 hours[22]. While Stella et al. reported that CVS symptoms are more common in people using computer for more than 8 hours daily[23].

In our study, the participants who take break experience less frequent symptoms however; there was no significant association between frequency of breaks and relief of symptoms. Latest research has also supported the evidence that taking break do not relief the symptoms associated with CVS.[24] In contrast, several studies have supported that without taking breaks visual symptoms of CVS get aggravated. [14, 21].Study conducted by Straker et al also document that musculoskeletal symptoms get aggravated by sitting posture[25]. Our study fairly highlighted this public health issue and identified the risk factors associated with computer vision syndrome. However, there are certain limitations to our study. Since it was the cross sectional study it limits the establishment of the casual association between identified risk factors and CVS. It was a single centered study and symptoms of CVS were self reported. In future, prospective studies with follow ups should be designed to establish the causal inference.

It is recommended to follow the rule of 20/20/20 to reduce the symptoms of computer vision. Rule of 20/20/20 states that one should sit 20 feet away; take 20 min break after 20 minutes of computer use[2].

CONCLUSION

This study concludes that computer vision syndrome is a highly frequent condition among undergraduate medical students.

It is evident from our study that computer related health problems now become a significant public health issue. There is dire need to create public health awareness by organizing awareness lectures in order to make general public sensitize about deleterious health effects of computer usage. Young generation should be addressed by organizing health awareness lectures at academic institutes to make youth aware of health problems associated with computer usage.

This is multi disciplinary task and there is need of integration of all concerned stake holders in order to make effective strategies to halt this problem. All concerned authorities should collaborate to make effective implementation of preventive strategies and ergonomics. Periodic monitoring and medical examinations should be arranged to avoid complications and to limit disability.

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