

Computer Vision Syndrome and Associated Factors among Students of Faculty of Medicine, Cairo University

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Abstract

Background: Computer Vision Syndrome (CVS) is an emerging health problem which is unceasingly increasing worldwide. It refers to a group of eye and vision problems experienced during or related to computer and other VDTs use.

Aim of Study: The objectives were to determine the prevalence of CVS among students of Faculty of Medicine in Cairo University and to detect the relation of various factors in computer use with occurrence of symptoms.

Patients and Methods: This study is a cross-section study in which 260 medical students from different grades of Faculty of Medicine in Cairo University were included. Participants were interviewed using self-administered Computer Vision Syndrome Questionnaire (CVS-Q).

Results: The current study reveals that 75% of medical students in Faculty of Medicine suffered from CVS. Headache (81.5%) and eye pain (63.8%) are the most frequent CVS symptoms experienced by the students. CVS prevalence is found to be more among female students (78.7%) than among male ones (71%). It is also found to be more among glasses wearers (78.8%) than among non-glasses wearers (70.7%) and much more among contact lenses wearers (92.9%) than among non-contact lenses wearers (72.8%). There is significant linear correlation between duration of use of VDTs (by hours/day) and the score of CVS.

Conclusion: This study revealed that CVS is a prevalent problem among students of Faculty of Medicine, Cairo University.

Key Words: *Computer vision syndrome – Medical students – Computers use – Laptops.*

Introduction

IN the era of technology advancement, the use of computers and other electronic devices has become

crucial and vital in all aspects of our daily life. All age groups whether adults and children are using computers and other electronic devices for professional and leisure purposes. Millions of people spend hours using Video Display Terminal (VDT) which include smartphones, laptops, tablets and others [1].

The great benefits of using these devices cannot be denied but on the other hand, it can cause many health hazards if used improperly. These health hazards include visual and musculoskeletal problems. Common musculoskeletal complains include fingers tingling, cervical stiffness and backache. Prolonged usage can cause various visual symptoms that is known as Computer Vision Syndrome (CVS) [2]. The definition of CVS as stated by the American Optometric Association is “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” [3].

CVS symptoms includes redness, dry eyes, blurred vision, burning sensation and other symptoms of eye strain. Usually these symptoms last for short period of time and resolve after rest. But it has negative impact on productivity and quality of life, increased error rate and reduced job satisfaction [4]. Therefore, it is considered a global public health problem as more than 60 million people suffer from CVS worldwide and its incidence is around 1 million [5].

It is essential to conduct studies to address CVS and its severity. To our knowledge, few studies were done to detect the prevalence of CVS in Middle Eastern countries and no studies assess the magnitude of the problem in Cairo, Egypt. In this study, we tried to assess the prevalence of CVS

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among medical students in Cairo University. This will help to increase the awareness of medical student about health hazards of VDTs.

Patients and Methods

This cross-sectional study was conducted in Faculty of Medicine, Cairo University, from March 2016 till March 2017.

Sample size:

Using Epicalc 2000, sample size was calculated using the following input: Prevalence of CVS among medical students was 79% according to a study done by Logaraj et al., in 2014 [6], significant level of 0.05 and power of 95%, the total sample size was 254 participants to be increased to 260 participants. A stratified random sample according to the grade was done.

Inclusion and exclusion criteria:

Students from different grades in the faculty who approved to participate in the study were included in the study. Students who had recent eye operations up to 1 year ago and students who have eye disease at time of the study or chronic eye problems were excluded.

Study tool:

Self-administered questionnaire which consists of 2 parts. The first part assesses their pattern of computer use, other factors that may influence occurrence of symptoms (average time of sleeping and practicing other activities requiring near vision), and whether they are wearing glasses or lenses. The second part is the CVS-Q [7] (Crespo et al., 2015), which assesses the frequency and intensity of 16 symptoms of CVS. The severity is calculated by multiplying the frequency by the intensity then it is given a score of either 0, 1 or 2. The subject is considered to have CVS if the total score of the severity of the 16 symptoms is ≥ 6 . The sensitivity and specificity of the questionnaire is over 70%.

The questionnaire was tested on 20 students from different grades. Most of the students did not answer the question asking about the visual acuity so it was deleted from the questionnaire.

Statistical methods:

Data were coded and entered using the statistical package SPSS Version 21. Data were summarized using number and percent for qualitative variables while mean, standard deviation, median and interquartile range were used for quantitative variables.

Comparison between groups were done using Chi-square test for qualitative variables. In non-parametrical, Mann-whitney test was used to compare quantitative variables which are not normally distributed. Correlations were done to test for linear relations between variables. *p*-values less than or equal to .05 were considered as statistically significant.

Ethical consideration:

Permission for using CVS-Q was obtained from the author in February 2016. The research and ethical committee approval of the study was taken in April 2016. The vice dean permission for collecting questionnaires from the students was taken in April 2016. Written consent was taken from all the participants after explaining the aim of the study to them.

Results

Two hundred and sixty students were included in the study, their age ranged from 17 to 25 years with a mean age 20.82 ± 1.83 years. Around 48% of them were male while 52.3% were female students. Almost similar numbers of students are taken from each grade (average 43 students from each grade).

Around 50% of the medical students do not wear neither glasses or contact lenses while 41.9% of the students wear glasses only, and 10.8% wear both glasses and contact lenses. Only 4% of students use the screens at a level above the eye level while 58% of them use screens at the eye level. Those who use screens at level below the eye level represent 38%.

It was found that the duration of computer or laptop use by years (mean= 8.87 ± 3.53 years) is more than duration of other VDTs use by years (mean= 6.14 ± 2.79 years). On the contrast, duration of use by number of hours per day for computer or laptop (with mean= 3.28 ± 2.24 hours) is less than that of other VDTs (with mean= 5.63 ± 3.5 hours).

Sleeping hours of the students range from 2-12 hours with a median of 7 ± 1.47 and time spent by the students practicing other activities that need near vision range from 0-12 with a mean of 5.3 ± 2.43 hours.

Regarding CVS, the score achieved by the students ranges from 0 to 27 (considering that score equal to or more than 6 is CVS +ve and score below 6 is CVS -ve). Seventy five percent of

medical students suffered from computer vision syndrome and considered CVS +ve while only 25% of them are considered CVS -ve and didn't suffer from the syndrome. The most frequent three symptoms experienced by the students are headache (81.5%) followed by eye pain (63.8%) followed by tearing (58.8%) while the least frequent symptom is double vision which is experienced by 18.5% only as shown in (Table 1).

Table (2) shows that 71 % of male students suffered from CVS while affected female students represent 78.7% but this is not statistically significant (p -value=. 15 2). About half of the students of the 4th grade (54%) are classified to be CVS +ve and this is the least percent of students among all the grades.

There is statistically significant difference (p -value=.046) in number of sleeping hours between the two groups, CVS +ve group (with mean=7.24 hours, median=7 hours, range=2-12) and CVS -ve group (with mean=7.63 hours, median=8 hours, range=5-12).

There is no statistically significant difference in duration of use of computer or laptop (either by years or hours/day) between CVS +ve group and CVS -ve group. On the contrast, and there is statistically significant difference (p -value=.038) between duration of use of other VDTs by years in the CVS +ve group (with mean=6.34 years, median=6 years, range=1-15) and CVS -ve group (with mean=5.54 years, median=5 years, range=1-12). Also, the duration of use of other VDTs by hours/day in the CVS +ve group (with mean=5.98 hours, median=5 hours, range=1-18) is more than its duration in CVS -ve group (with mean=4.57 hours, median=3 hours, range=1-16) and this is also statistically significant (p -value=.001). Moreover, the total duration of use of all screens by hours/day in the CVS +ve group (with mean=9.34 hours, median=9 hours, range=2-20) is more than the total duration of use by the other group (with mean=7.62 hours, median=7 hours, range=2-17) and this is statistically significant (p -value=.002).

As shown in (Table 3), there is statistically significant difference medical students suffering from CVS and those who are not suffering from CVS regarding wearing contact lens. Also, there is significant correlation between duration of use of other VDTs by hours/day and the score of CVS (Table 4).

Table (1): Frequency of symptoms of CVS among medical students during the academic year 2016-2017.

Symptom	Total	
	Number	Percent (%)*
1- Burning	139	53.5
2- Itching	119	45.8
3- Feeling of foreign body	88	33.8
4- Tearing	153	58.8
5- Excessive blinking	117	45
6- Eye redness	149	57.3
7- Eye pain	166	63.8
8- Heavy eyelids	91	35
9- Dryness	101	38.8
10- Blurred vision	149	57.3
11- Double vision	48	18.5
12- Difficult focusing for near objects	118	45.4
13- Increased sensitivity to light	145	55.8
14- Coloured halos around objects	84	32.3
15- Feeling sight is worsening	134	51.5
16- Headache	212	81.5

*: Percent within the gender.

Table (2): Percent of CVS among male & female students and among students of different grades during the academic year 2016-2017.

Score	CVS +ve		CVS -ve		Total		p -value
	N**	%*	N	%	N	%	
<i>Gender:</i>							
Male	88	71	36	29	124	100	0.152
Female	107	78.7	29	21.3	136	100	
<i>Grade:</i>							
1st	34	77	10	23	44	100	.033
2nd	34	77	10	23	44	100	
3rd	37	80	9	20	46	100	
4th	22	54	19	46	41	100	
5th	33	79	9	21	42	100	
6th	35	81	8	19	43	100	

*: Percent (%) within the variable.

**N: Number.

Table (3): Relations between different variables and score of CVS among students of different grades during the academic year 2016-2017.

The variable	Score	CVS +ve		CVS -ve		Total		p -value
		N**	%*	N	%	N	%	
<i>Wearing glasses:</i>								
Yes		108	78.8	29	21.2	137	100	.132
No		87	70.7	36	29.3	123	100	
<i>Wearing contact lenses:</i>								
Yes		26	92.9	2	7.1	28	100	.021
No		169	72.8	63	27.2	232	100	
<i>Level of the screen:</i>								
Above eye level		10	90.9	1	9.1	11	100	.460
At eye level		112	74.2	39	25.8	151	100	
Below eye level		73	74.5	25	25.5	98	100	
<i>Type of light:</i>								
Fluorescent light		148	76.3	46	23.7	194	100	.422
Natural light		26	66.7	13	33.3	39	100	
Light of the source		21	77.8	6	22.2	27	100	

*: Percent (%) within the variable.

**N: Number.

Table (4): Correlations between different quantitative variables and score of CVS: (Spearman's rho).

The variable	Score of CVS
Age:	
Correlation Coefficient	-.050-
Sig. (2-tailed)	.424
Use computer or laptop (Years):	
Correlation Coefficient	.017
Sig. (2-tailed)	.791
Use computer or laptop (Hours/day):	
Correlation Coefficient	.067
Sig. (2-tailed)	.285
VDTs use (years):	
Correlation Coefficient	.103
Sig. (2-tailed)	.096
VDTs use (Hours/day):	
Correlation Coefficient	.208**
Sig. (2-tailed)	.001
Time of sleeping (Hours):	
Correlation Coefficient	-.083-
Sig. (2-tailed)	.181
Time of practice activities need near vision (Hours):	
Correlation Coefficient	.060
Sig. (2-tailed)	.339

** : Correlation is significant at the 0.01 level (2-tailed).

Discussion

The aim of this study was to determine the prevalence of CVS among students of faculty of medicine in Cairo University and to detect the relation of various factors with occurrence of symptoms from the total of 280 study participants, 75% of Kasr Al-Ainy medical students suffered from CVS. This finding is consistent with the work of Iqbal et al., in 2018 [8], where 86% of the medical students in Sohag University in Egypt suffered from one or more of symptoms of CVS when they use digital screens for 3 hours or more per day. Similarly, Reddy and colleagues in 2013 [9] reported that the prevalence of one or more symptoms of CVS among 795 Malaysian University students was 89.9% when the daily use of digital screens was 2 hours or more. In contrast to that, Khola et al., in 2016 [10] reported that 67.2% of undergraduate medical students experienced at least one symptom related to CVS. This difference in the prevalence of CVS may be due to the difference in the method used to consider the subject as affected by CVS or not. The other studies considered experiencing one or more symptoms as being affected by CVS. While in the current study, being affected by CVS is based on the score of CVS-Q.

In the current study, there is direct correlation between duration of use of other VDTs by hours/day and the score of CVS. Also, Al Rashidi and Alhumaidan in 2017 [11] and Khola and her colleagues

in 2016 [10] reported significant association between the development of CVS and use of computer for longer duration. Many other investigators reported the same findings [12-14].

In our study, headache (81.5%), eye pain (63.8%) and excessive tearing (58.8%) are the most frequent CVS symptoms experienced by the students. In another study conducted by Logaraj et al., in 2014, found that headache and dry eye were the most common symptoms experience by medical students [6]. While Agarwal and his colleagues in 2013 [15], reported that the most frequent ocular symptoms were eye strain (53.8%), itching (47.6%) and burning (66.7%).

In the current study, there was no significant relation between the age of the medical students and occurrence of symptoms of CVS. Also, Zainuddin & Isa in 2014 found no significant association between age and CVS [16]. This was not the case in the study done by Ranasinghe and his colleagues in 2016 [14], where the prevalence of CVS increased with the increasing age of the computer user. The difference between the studies may be due to the difference in the age of study participants as the age of the participants in the study of Ranasinghe et al., 2016 ranged from 18 to 60 years.

Limitations of the study include inability to perform ophthalmic examination to the medical students and neck and shoulder pain is not included in the symptoms of CVS-Q and thus not included in the calculated scores.

Conclusion:

The current study reveals that 75% of medical students in faculty of medicine suffered from CVS, with the most experienced symptoms of headache and blurred vision.

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متلازمة الرؤية الحاسوبية والعوامل المرتبطة بها بين طلاب كلية الطب، جامعة القاهرة

إن متلازمة الرؤية الحاسوبية هي أحد المشكلات الصحية المتعلقة باستخدام الحاسب الآلي وغيره من أجهزة العرض البصرية الطرفية أمثال الهواتف الذكية والحاسوب المحمول والأجهزة اللوحية.

تتكون هذه المتلازمة من مجموعة من الأعراض كإجهاد العين، جفاف العين، صداع الرأس، عدم وضوح الرؤية والرؤية المزدوجة، إحمرار العين، ظهور هالات ملونة حول الأشياء وغيرها من المشكلات المرتبطة بالعين والرؤية.

كانت أهداف هذه الدراسة هي تحديد مدى إنتشار متلازمة الرؤية الحاسوبية بين طلاب كلية الطب بجامعة القاهرة، وتقييم الإرتباط بين العوامل المختلفة في استخدام الحاسب الآلي مع حدوث الأعراض.

هذه الدراسة هي عبارة عن دراسة مقطعية تم فيها إجراء مقابلات شخصية مع مائتين وستين طالباً من طلاب كلية الطب بجامعة القاهرة، وتم جمع إستبيانات بحثية فيما يخص متلازمة الرؤية الحاسوبية من الطلاب وذلك بعد شرح أهداف الدراسة لهم.

تبين من الدراسة الحالية أن متلازمة الرؤية الحاسوبية تؤثر على ٧٥٪ من طلاب كلية الطب مع كونها أكثر إنتشاراً بين الطالبات (٧٨.٧٪) منها بين الطلاب الذكور (٧١٪). تبين من هذه الدراسة أن الأعراض الأكثر شيوعاً والتي يعاني منها طلاب كلية الطب هي صداع الرأس (٨١.٥٪)، وآلم العين (٦٣.٨٪).

كشفت هذه الدراسة أن متلازمة الرؤية الحاسوبية هي مشكلة سائدة بين طلاب كلية الطب، جامعة القاهرة.