Prevalence, Knowledge and Associated Factors of Computer Vision Syndrome in Asser Region, Kingdom of Saudi Arabia

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ABSTRACT

Study Design: Cross sectional

Background: Computer vision syndrome (CVS) is defined as a collection of vision-related symptoms and musculoskeletal symptoms that happen due to continuous and improper use of electronic devices, such as computers, tablets, and smart phones. It causes eye problems and muscular complaints, which may lead to a decreased efficiency and quality of life. The aim of this study is to estimates the prevalence, knowledge, and associated factors of CVS among electronic device users in the Asser region, Kingdom of Saudi Arabia.

Methods: A Descriptive cross-sectional study was conducted to All Saudi and non-Saudi population of Aseer region except People who can't read or understand Arabic. The sample size required for this study is calculated as 700 participants for 95% confidence level and a margin of error of 5%. The participants received electronic self-administered questionnaire distributed via social media platforms during 2022. The tool covers the following three parts: bio demographic data, knowledge and associated factors related questions and prevalence of the CVS symptoms. Informed consent will be obtained from all participants. Furthermore, the questionnaire is anonymous.

Results: A total of 700 participants who met the inclusion criteria completed the study questionnaire. The age of the responders varied from less than 20 years to older than 60 years. A total of 367 (53.71%) responses were females. Eye problems after the use of electronic devices were experienced by 393 (56.14%) of the responders. Neck and shoulder pain being the most common symptom (79.95%), followed by blurred vision (71.07%), burning eye sensation (61.68%) and headache (60.41%). The more spent time with less taking breaks on electronic devices increasing the incidence of CVS symptoms. Back bent position was correlate with CVS symptoms .

Conclusion: Computer vision syndrome (CVS) is very common among the study participants, with neck and shoulder pain being the most common symptoms. This study has shown that the development of CVS is associated significantly with the longer duration of electronic devices use(more than 5 hours daily), no taking breaks while using electronic devices, short distance (less than 40cm)from the electronic devices and sitting with back bent. We found in our study that the computer vision syndrome (CVS) is a growing public health problem, resulting in variety of complaints and symptoms. Thus, preventive measures and community education about the burden of such lifestyle, and the proper handling of devices must be addressed.

Keywords: Computer Vision Syndrome, CVS, Neck and Shoulder Pain, Aseer, Prevalence

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INTRODUCTION

Over the past 20 years, there has been great advancement in the information technology. The use of electronic devices such as computers, laptops, smartphones, and tablets in every place has made life easier[1,2]. According to American Optometric Association (AOA) computer vision syndrome (CVS) is defined as a complex of eye and vision problems related to near work experienced during computer use[3]. The prolonged use of computers and other digital electronic devices often leads to CVS[4]. CVS leads to decrease efficiency at work and the quality of life[5].

CVS symptoms occur when there is a need to increase the visual demand to the extent it exceeds the person's visual ability[3]. Most of CVS symptoms are transient and no permanent visual damage was reported in previous studies, some might still experience visual difficulty after using electronic devices[6]. A very long list of symptoms has been reported by different studies including headache, eye strain, double vision, watering, dryness of eyes, accommodation problems, tired eyes, and irritation[7]. Also, musculoskeletal related complaints such as tingling and numbness of the fingers, cervical stiffness and backache are well known to be associated with prolonged usage of computer[8].

Many factors contribute to symptoms development and severity divided into personal factors and non-personal factors. Personal factors include bad posture, viewing distance from device, inappropriate viewing angle, prior eye diseases, and aging. Non-personal factors include inadequate light, room illumination, weak resolution and poor contrast[9,10].

Globally, around 60 million computer workers experience discomfort from CVS[11]. Nearly 45 million workers use computers by staring at the screen for hours continuously[6].

A large proportion of the general population is familiar with the symptoms attributed to CVS. One study found that 61.4% of computer dependent workers complained of lower back, shoulder, and neck pain, while another study found that 70.6% experienced eye strain[1,12]. Many studies conducted in Saudi Arabia, United Arab Emirates, and Malaysia showed that university students had a high prevalence of symptoms related to CVS[7,13,14]. Also, there are studies of computer vision syndrome, in Nepal and Ethiopia showed that the majority of medical students and bank workers had inadequate knowledge of CVS[10,15].

METHODS

A Descriptive cross-sectional study was conducted among all Saudi and non-Saudi population in Asser Region in Saudi Arabia. An online survey was distributed through social media platforms around the kingdom between the period from All respondents who used computer, laptops or smart phones were included in the study. The size of our cross-sectional study was required 700 participants for 95% confidence level and a margin of error of 5% .The sampling was done as simple random sampling technique. The study and was approved by the Research and Ethical Committee at the College of Medicine, King Khalid University. Ethical approval obtained on 24 august 2022. The participants were surveyed using a pre-tested structured questionnaire, which included the biodemographic data, knowledge and associated factors related questions and prevalence of the CVS symptoms. The study subjects were asked to report any eye or extra ocular symptoms experienced while on the continuous use of computer and smartphones either at work or home and exclude the people who don't read or understand Arabic. They were asked to mark whether they had experienced visual problems during or after electronic device use. Statistical data analysis was conducted using Statistical Package for Social Sciences (SPSS). Descriptive data were presented as percentages and unadjusted odds ratios (OR) to measure the strength of association and 95% confidence intervals (CI). The Chi-square test was applied to identify differences between the studied variables (such as the increase in hours of computer use), as well as simple frequency tables to establish the frequency distribution of the responses. The threshold for statistical significance was set at a P value respondent who used computer, laptops or smart phones were included in the study. All data have been collected and coded in Microsoft Excel then imported to SPSS (Statistical Package for the Social Science)

Descriptive statistics will include mean and standard deviation for continuous variables and frequencies and percentages for categorical variables. For analytical statistics, association between main outcome and different demographic variables will be tested by Chi square test for categorical variables and t-test.

RESULTS

A total of 700 participants who met the inclusion criteria completed the study questionnaire. The socioeconomic data are summarized in table 1. The age of the responders varied from less than 20 years to older than 60 years. A total of 367 (53.71%) responses were females. Six hundred and eighty-five (97.86%) of responders were Saudi citizens. The majority of responders were city residents accounting for 494 (70.57%). In terms of education, 444 (63.43%) were university graduates. Figure 1 illustrate awareness of computer vision syndrome among the study participants. Only 180 (25.71%) of responders were aware of computer vision syndrome. Figure 2 demonstrate the level of knowledge regarding meaning of CVS among the participants. 126 (70%) of responders had good knowledge level regarding CVS.

Figure 3 demonstrate the eye problems after the use of electronic devices were experienced by 393 (56.14%) of the responders.

Figure 4 illustrates the distribution of symptoms associated with electronic device use among the study participants. Neck and shoulder pain was the most frequently reported symptom (79.95%), followed by blurry vision (71.07%), burning eye sensation (61.68%), headache (60.41%), eye redness (45.43%), foreign body sensation (43.91%) and tearing (39.09%).

As far as the risk factors of computer vision syndrome, 395 (56.43%) of the responders reported spending more than 5 hours daily using electronic devices, 235 (33.57%) reported taking no breaks while using electronic devices, 279 (39.86%) maintain less than 40 cm from the electronic device. Regarding the position, while using electronic devices, 311 (44.43%) reported sitting with their back bent, 214 (30.57%) lying down and 175 (25.00%) sitting with their back straight. In terms of the brightness of the electronic device screen, 373 (53.29%) reported intermediate screen brightness and 129 (18.43%) reported bright screen. For the room light brightness while using electronic devices, 441 (63.00%) reported intermediate brightness, 113 (16.14%) bright light, and 146 (20.86%) faint light. Table 2 summarizes the frequency of those risk factors.

Table 3 illustrates the factors associated with experiencing eye symptoms with electronic device use. Of those risk factors, age, position while using electronic devices, and brightness of the electronic device screen were significantly associated with experiencing eye symptoms.

In multivariate analysis, an age of more than 40 years was associated with an increased risk of eye symptoms with electronic device use (odd

ratio [OR] 1.59, 95 % confidence interval [CI] 1.15 – 2.22), sitting with back-bent was associated with increased risk (OR 1.60, 95% CI 1.18 – 2.18) and the device screen light bright or very bright was associated with increased risk (OR 1.53, 95% 1.10 – 2.14). The result is summarized in table 4.

Table 1: Socio demographic characteristics of study participants, Aseer, Southwestern Region, KSA

Socio demographic variable		Total = 700 n (%)
Place of Residence	City	494 (70.57)
	Village	206 (29.43)
Gender	Female	376 (53.71)
	Male	324 (46.29)
Nationality	Egyptian	1 (0.14)
	Jordan	2 (0.29)
	Palestinian	1 (0.14)
	Saudi	685 (97.86)
	Sudanese	4 (0.57)
	Syrian	1 (0.14)
	Yemen	6 (0.86)
Age	Less than 20 years	98 (14.00)
	20-29 years	218 (31.14)
	30-39 years	139 (19.86)
	40-59 years	226 (32.29)
	More than 60 years	19 (2.71)
Level of Education	Primary School	12 (1.71)
	Intermediate School	22 (3.14)
	High School	173 (24.71)
	University	444 (63.43)
	Postgraduate education	48 (6.86)
	Not Educated	1 (0.14)

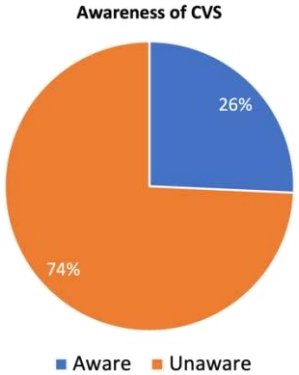

Figure 1 : Awareness of CVS

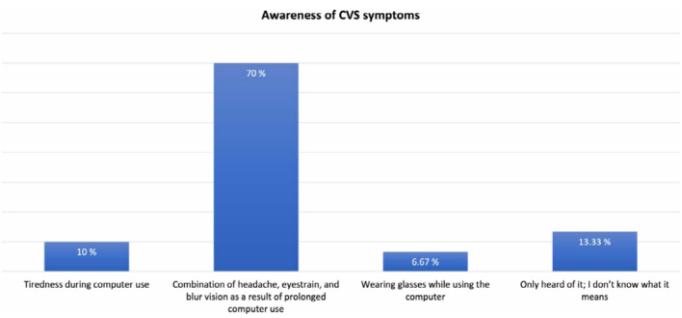

Figure 2 : Awareness of CVS symptoms

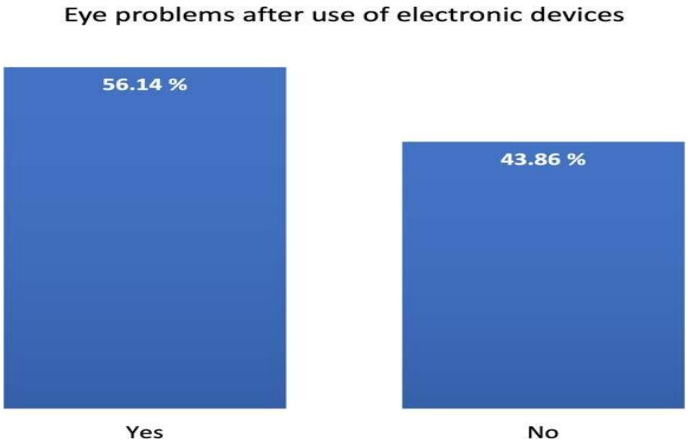

Figure 3 : Distribution of the Eye Problems After Use of Electronic Devices

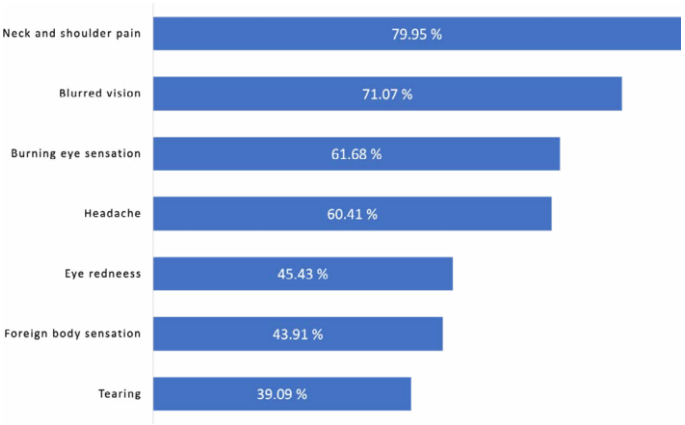

Figure 4: Distributions of symptoms experienced after the use of electronic devices

Table 2: The distribution of risk factors of computer vision syndrome

The daily time spent on electronic devices use n (%)	
Less than 2 hours	93 (13.29)
2 to 4 hours	212 (30.29)
More than 5 hours	395 (56.43)
Breaks while using electron c devices n (%)	
Every more than 1 hour	145 (20.71)
Every 1 hour	137 (19.57)
Every 30 minutes	183 (26.14)
No breaks	235 (33.57)
Distance between the user a d the electronic device n (%)	
Less than 40 cm	279 (39.86)
Between 40 to 76 cm	164 (23.43)
More than 76 cm	14 (2.00)
Do not know	243 (34.71)
Position while using electronic devices n (%)	
Sitting with back bent	311 (44.43)
Sitting with back straight	175 (25.00)
Lying down	214 (30.57)
Brightness of electronic dev ce screen n (%)	
Faint	106 (15.14)
Intermediate	373 (53.29)
Bright	129 (18.43)
Very bright	61 (8.71)

Very faint	31 (4.43)
Brightness of room light during the use of electronic device n (%)	
Faint	146 (20.86)
Intermediate	441 (63.00)
Bright	113 (16.14)

Table 3: Factors associated with experiencing eye symptoms with electronic device use

Presence of eye symptoms	Symptoms Absent	Symptoms Present	p value
n (%)	307 (43.86)	393 (56.14)	
Age			
Less than 20 years	54 (17.59)	44 (11.20)	0.015*
More than 60 years	6 (1.95)	13 (3.31)	
Between 20 to 29	101 (32.90)	117 (29.77)	
Between 30 and 39	64 (20.85)	75 (19.08)	
Between 40 and 59	82 (26.71)	144 (36.64)	
The daily time spent on electronic devices use			
Less than 2 hours	48 (15.64)	45 (11.45)	0.172
More than 5 hours	163 (53.09)	232 (59.03)	
Between 4 to 5 hours	96 (31.27)	116 (29.52)	
Breaks while using electronic devices			
Every more than 1 hour	61 (19.87)	84 (21.37)	
Every 1 hour	58 (18.89)	79 (20.10)	
Every 30 minutes	86 (28.01)	97 (24.68)	0.785
No breaks	102 (33.22)	133 (33.84)	
Distance between the user and the electronic device			
Less than 40 cm	113 (36.81)	166 (42.24)	
More than 76 cm	7 (2.28)	7 (1.78)	0.075
Between 40 to 76 cm	86 (28.01)	78 (19.85)	
Do not know	101 (32.90)	142 (36.13)	
Position while using electronic devices			
Sitting with back bent	116 (37.79)	195 (49.62)	0.007**
Sitting with back straight	88 (28.66)	87 (22.14)	
Lying down	103 (33.55)	111 (28.24)	
Brightness of electronic device screen			
Bright	49 (15.96)	80 (20.36)	
Faint	56 (18.24)	50 (12.72)	0.008**
Intermediate	171 (55.70)	202 (51.40)	
Very bright	16 (5.21)	45 (11.45)	
Very faint	15 (4.89)	16 (4.07)	
Brightness of room while using electronic device			
Bright	42 (13.68)	71 (18.07)	0.275
Faint	64 (20.85)	82 (20.87)	
Intermediate	201 (65.47)	240 (61.07)	

Table 4: Factors associated eye symptoms and electronic device use

	Odd ratio (OR)	95% confidence intervals	p value
Age more than 40 years	1.59	1.15 – 2.22	0.006**
Sitting with back bent	1.60	1.18 – 2.18	0.003**
Device screen light bright or very bright	1.53	1.10 – 2.14	0.012*

DISCUSSION

This study aimed to determine the level of knowledge and awareness towards computer vision syndrome and to identify the factors affecting on the CVS. To the best of our knowledge, this study may be the first of its kind in Asser region.

Neck and shoulder pain was the most frequently reported symptom (79.95%) A similar study done among high school teachers in Riyadh region found 84.9% of participants suffering from neck and shoulder pain[16]. Musculoskeletal pain and especially neck and shoulder pain depends on many factors such as incorrect posture and the level of the device in relation to the level of the body[16]. Neck and shoulder pain result from muscle fatigue due to long hours of using electronic devices[17]. Maintaining a static posture while using digital devices weakens and destabilizes the neck and shoulder muscles, resulting in intense pain[18]. The second-most experienced symptom in this study was blurry vision (71.07%). Compared to previous studies that found a blurred vision showed a prevalence of (69.6%) among high school teachers in Riyadh[16]. Also, symptoms experienced by participants including burning eye sensation (61.68%), headache (60.41%), eye redness (45.43%), foreign body sensation (43.91%) and the least reported symptom was tearing (39.09%). On the other hand, headache was one of the most reported symptoms associated with CVS in other studies done in Ajman and King Saud University[9,13]. in this study, it was the fourth most common symptom among participants. Time spend on the electronic devices was discussed in our study where 395 person (56.43%) of them spending more than 5 hours on electronic devices, while another study done in King Saud University there was only 49 (14.9%) of students who use devices more than 5 hours[9]. In our study 235 (33.54 %) they don't take breaks, another study done among high school teachers in Riyadh reported that 156 (34.6%) are taking breaks every 30 minutes[16]. Also, the Distance between eyes and device played a role in our study, 279 (39.86%) participants maintain less than 40 cm between them and the devices. Regarding the setting position, most common position reported is bending the back which is 311 (44.43%).

CONCLUSION

The prevalence of CVS symptoms among 700 participants in Aseer region was high. The most frequent symptom experienced by participants was shoulder and neck pain (79.95%), followed by blurry vision (71.07%). CVS was significantly associated with age more than 40, position while using electronic devices, duration of using electronic devices and distance from electronic devices. The majority of the participants showed a low level of awareness as well as knowledge, which indeed requires further health education about the effects of long computer use on the eyes, and how to avoid the other factors that contribute to CVS symptoms.

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Potential Conflicts of Interest: None

Competing Interest: None

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