

Keywords: CVS; Ethiopia.

Introduction

Background Information

CVS is a complex of eye and vision problems related to the activities that stress the near vision during the prolonged use of the VDT [1].

The main ocular symptoms reported among computer workers are eye strain, irritation, burning sensation, redness, blurred vision and double vision. Ocular surface abnormalities following an extended period of computer usage causes symptoms such as dryness of the eyes, redness, gritty and burning sensation in addition to stress, anxiety, tense neck and shoulders [2].

Computer vision syndrome affects 90% of the people who spend more than three hours of a day at a computer and 100 million people use computers daily at work in the United States [4].

It has a negative impact on health and working effectiveness like poor visual functions, increased stress level, reduced effective work hours, frequent absence from work and possible increase in errors [1].

Excessive visual demand for digital images is one of the possible causes of CVS. For that, frequent refreshing of the computer screen has been associated with decrease ocular symptoms and more user friendly [2, 3].

Engineers, technology experts, computer science professionals are highly victim peoples among office workers which makes the problem more in these individuals [6].

The worldwide prevalence of CVS ranges from 25-93%. CVS is the most frequently reported health problem occurring among 70% of computer users. 1 out of 6 patients requiring eye examinations have computer-related eye problems. Without proper vision correction, worker productivity can decrease by as much as 20% [4,5].

Prolonged use of computers, position, light intensity and spectacle wear are the factors associated with CVS. Males had a higher risk of

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developing dry eyes (OR = 1.8, 95%) and it was statistically significant. On the other hand, males were at lower risk of developing headache (OR = 0.6) and neck and shoulder pain (OR = 0.6,) compared to females, which was statistically significant. Significant correlation was found between taking less frequent breaks while working on computers with blurred vision and dry eyes [6].

Individuals who develop CVS have reduced work effectiveness and many ocular complications. In several times, CVS is treated when a patient complains about it and when they visit the clinic, but by conducting this study it is possible to prevent the predisposing factors for developing CVS. Currently, the number of individuals who are visiting the eye clinic due to CVS is increasing dramatically. There is lack of detail information about the magnitude of the problem and the factors which predominantly causes CVS in the study area. Besides that, there is lack of a previous study done in this area even if the number of victims increased. This study also has an importance for further studies as a baseline data.

Objectives and Hypothesis

- To assess the prevalence of CVS and associated factors on students of Hawassa university, institution of technology, 2020.
- To determine the magnitude of CVS on students of Hawassa university, institution of technology, 2020.
- To identify the associated factors for CVS on students of Hawassa university, institution of technology, 2020.
- CVS has high magnitude among engineering students and the main predisposing factors are ergonomic factors mainly.
- CVS reduce the amount of amplitude of accommodation.

Materials and Methodology

Institution based cross sectional study design was used from March to May, 2020. Hawassa city is situated on 273km from Addis Abeba and it is the capital city of south Ethiopia. Hawassa University, the faculty of technology has established almost 10 years ago. In the faculty there are 7410 students, 417 academic students, 17 expatriate students and 95 administrative students.

initial sample (n) was estimated using the statistical formula:

$$n = \frac{P(1-P)Z^2}{d^2}$$

Among the calculated sample sizes, by considering the general and specific objectives the largest sample size were 896.

A multi stage sampling was used. The participants were asked in depth and assessed in what method they have been using the VDT based on the ergonomic standard use of VDT (Figure 1). After the collected data was cleaned and coded, EPI info 2002 for data entry and SPSS version 16.0 software for data analysis was used. First binary logistic regression was computed, and then factors with the P-value of less than 0.20 were re-entered to multinomial logistic regressions to identify strength of association with the dependent variable. Odds ratio with a 95% CI was used to display results. P value less than 0.05 were used to show statistical significance. Oral consent was obtained from each participant after explaining the purpose and importance of the study. The ocular examinations and evaluations were performed by professional optometrists and study participants were informed that

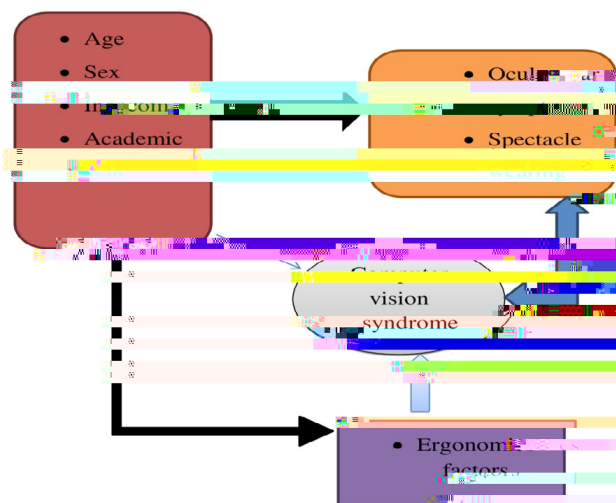


Figure 1: Showing the conceptual framework of the independent variables.

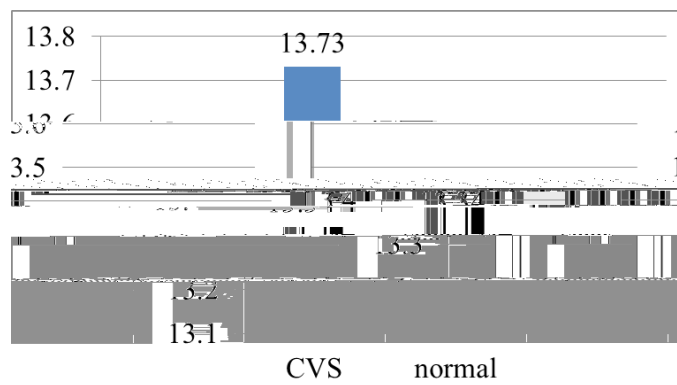


Figure 2: Shows the relationship and comparison of the effect of CVS on amplitude of accommodation among engineering students in Hawassa University, IOT campus, 2019.

they do have a right to not be participated in the study. Confidentiality as well as privacy of the study participants was maintained during and after data collection. Advice regarding prevention of CVS and proper utilization of VDT was given. Individuals who were diagnosed with the problem have taken a medication prescription and protective spectacle for their future use of VDT (Figure 2).

Visual Display Terminals(VDT) are any kind of technological tools used for day to day activity which has a screen and need a visual demand like desk top computers, lap top computers, tablets, smart phones, iPod, any computerized monitoring devices and others are VDT.

Computer Vision Syndrome (CVS) is having the ocular symptoms after prolonged use of VDT either intermittently or continuously for at least one week during the last twelve months was defined as computer vision syndrome.

Ocular Symptoms are presence of pain in and around the eyes, headache, blurred near vision, blurred distant vision, dry eyes, sore/irritated eyes, red eyes, excessive tearing, double vision, twitching of eyelids, and changes in visualizing colors were assessed as symptoms of CVS in this study. Individual who have reported one of the above sign and symptoms was considered as positive for CVS.

Results

Among the study participants (81.5% respondent rate), 454(55.9%) were male students and the mean age of the study participants were 21 ± 5.29 years and 609(75%) of the students came from urban area. Most of the students (72.9%) have less than 20 dollars monthly income (Table 1).

Prevalence of Computer Vision Syndrome

The prevalence of CVS was 41.7% (339). CVS was more prevalent on 18 – 24 yrs of age 97.9% (332), male 61.4% (208), urban 83.8% (284), income per month less than 20 dollars 66.4% (225) and 3rd year students 21.2% (72).

Symptoms more prevalent on students who has CVS were mild tearing 52.8% (179), eye tiredness 44.8% (152), blurring of vision 38.6% (131) (Table 2).

Computer vision syndrome was more prevalent on students who spent on medium period of VDT use 51.3% (174), medium duration of VDT use 44.2% (150), near distance from VDT 48.7% (165), downward viewing position 70.5% (239), illuminated room condition 77.6% (263), both Smartphone and laptop users 36.6% (124), medium size of VDT user 62.5% (212), medium VDT brightness 56.6% (192) and numerous activities on VDT 46.6%(158).

Factors Associated With CVS

Factors with the P value <0.25 in binary logistic regression were included in multinomial logistic regression and urban(OR =1.66; CI = (1.14, 2.43)), no eye glass use(OR = 6.01 ; CI = (1.67, 21.63)), reading and playing game with VDT (OR = 2.33; CI = (1.33, 4.08)), reading and watching movies with VDT (OR = 1.49; CI = (1.02, 2.18)), using Smartphone (OR = 0.60; CI = (0.38, 0.95)), remote NPC (OR= 3.19; CI = (1.64, 6.25)) and moderate size of VDT (OR = 0.63; CI = (0.41, 0.96)) were significantly associated with CVS (Table 3).

	no	247 (30.4%)	368 (45.3%)	615 (75.7%)
Screen filter	yes	17 (2.1%)	11 (1.4%)	28 (34.5%)
	no	322 (39.7%)	462 (56.9%)	784 (96.6%)
Size of VDT	small	57 (7.1%)	53 (6.5%)	110 (13.5%)
	medium	212 (26.1%)	358 (44.1%)	570 (70.2%)
	large	70 (8.6%)	62 (7.6%)	132 (16.3%)
Brightness of VDT				
	low	133 (16.4%)	149 (18.3%)	282 (34.7%)
	medium	192(23.6%)	310 (38.2%)	502 (61.8%)
	intensive	14 (1.7%)	14 (1.7%)	28 (2.4%)
Table use	yes	90 (11.1%)	106 (13.1%)	196 (24.1%)
	no	249 (30.7%)	367 (45.2%)	616 (75.8%)
Awareness	yes	44 (5.4%)	72 (8.9%)	116 (14.3%)
	no	295 (36.3%)	401 (49.4%)	696 (85.7%)

Table 3: Shows factors associated with CVS in multinomial logistic regression analysis on engineering students in Hawassa University, IOT campus, 2019.

variables		COR (CI)	AOR (CI)	P - value
Sex	male	0.68 (0.51, 0.91)		
Residence	urban	2.33 (1.64, 3.29)	1.66 (1.14, 2.43)	0.008
Academic year	1st	1.09 (0.65, 1.81)		
	2 nd	0.62 (0.41, 0.95)		
	3 rd	0.77 (0.51, 1.18)		
	4 th	0.79 (0.46, 1.35)		
Glass	no	0.15 (0.04, 0.52)	6.01 (1.67, 21.63)	0.006
Position	up ward	6.08 (0.71, 52.4)		
	Same level	0.64 (0.47, 0.86)		
Activities with VDT				
	reading	1.05 (0.69, 1.62)		
Drafting & designing		4.06 (1.04, 15.9)		
Watching movies		1.74 (0.35, 8.73)		
Reading & movies		1.64 (1.16, 2.34)	1.49 (1.02, 2.18)	0.039
Reading & game		2.52 (1.48, 4.26)	2.33 (1.33, 4.08)	0.003
VDT type				
	Smartphone	0.68 (0.47, 0.97)	0.60 (0.38, 0.95)	0.03
	tablet	0.68 (0.30, 1.52)		
	Lap top	0.68 (0.47, 0.99)		
	Tablet & lap top	0.79(0.45, 1.42)		
Size of VDT	small	0.93(0.56, 1.56)		
	Moderate	0.51 (0.35, 0.76)	0.63 (0.41, 0.96)	0.032
NPC	remote	0.28 (0.15, 0.54)	3.198 (1.64, 6.25)	0.001
	normal			

Discussion

The prevalence of CVS in this study was 41.7% which was between the worldwide prevalence range (25- 93%) and it was higher when it's compared with studies done in Brazil (40.4%) and Pakistan (25%). But,

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