



Knowledge, Attitude, and Practice of Computer Vision Syndrome among Office Workers in UiTM Puncak Alam

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Abstract

Computer vision syndrome (CVS) is a widespread issue affecting computer users. This study investigated the level of knowledge, attitude, and practice of using visual display unit on CVS among office workers in UiTM Puncak Alam campus and the association between these factors. Majority respondents knew that prolonged computer digital screen usage could lead to CVS(76%) and that practicing good ergonomics(76%) and taking regular screen breaks(69%) can reduce discomfort and risk of injury. There was a significant association between CVS knowledge and gender, years of working with computers, and refractive error status. This study will improve computer users' knowledge of CVS.

Keywords: Computer vision syndrome; Visual display unit; Knowledge; Attitude

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1.0 Introduction

Technological advances in computing allow workers to handle more information and be more productive. A widespread issue affecting millions of computer users is computer vision syndrome (CVS) (Sitaula & Khatri, 2018). CVS, also known as digital eye strain, refers to various vision and eye-related issues brought on by prolonged computer, tablet, e-reader, and mobile phone use (American Optometric Association, 2014).

The clinical features of CVS can be categorized into vision-related (asthenopic or accommodative), ocular surface-related symptoms (red eye, dry eye, burning, irritation), and extraocular symptoms (neck pain, shoulder pain, backache, and other skeletal discomforts) (Sen & Richardson, 2007). It is reported that around 60 million people suffer from CVS globally and that a million new cases occur each year. 3 CVS affects 75% of the people who work on computers, most markedly among those who work more than 3 to 4 hours on computers (Kumar & Sharma 2020). In Malaysia, 90% of undergraduate university students reported having symptoms of CVS, which were more frequent in those who used computers for more than two hours daily (Reddy et al., 2013). Environmental factors such as poor and imbalanced lighting, age, gender, and systemic disease affect the chance of getting CVS (Rosenfield, 2011). Nowadays, more workers use prolonged time in front of computers due to their work and online chatting.

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The best way to manage CVS is through prevention, including appropriate eye care and modification of environmental factors in CVS (Amirul et al., 2018). The incidence and severity of CVS can be reduced by having knowledge of CVS and implementing appropriate preventive measures while using the computers or any visual display unit (VDU), with awareness being the most important factor. Nonetheless, this study set out to investigate the knowledge, attitude, and practice of CVS and the association between knowledge, attitude, and practice of using VDU on CVS among office workers.

2.0 Literature Review

2.1 Computer vision syndrome (CVS)

CVS is also called digital eye strain induced by prolonged computer use (American Optometric Association, 2014). Indeed, it refers to a variety of eye strains and ocular discomfort. Eye strain, burning sensation, redness, blurred vision, and dry eyes are the most common ocular complaints reported by workers (Kumar & Sharma 2020; Lee et al., 2020; Zayed et al., 2021). Many workers are typically pressured to work extra hours on computers with more significant mental demands, working at a hectic pace resulting in increased muscle strain and force. They need more short work breaks due to workload, deadlines, and performance monitoring pressures. Griffiths et al. (2007) discovered these characteristics to be a significant risk factor for work-related musculoskeletal complaints. Besides, the duration of employment and pre-existing eye disease was linked to the severity of CVS (Ranasinghe et al., 2016).

2.2 Knowledge, attitude, and practice of CVS

Using a visual display unit (VDU) in everyday office work has been linked to an increase in the prevalence of specific symptoms of eye discomfort, which is also influenced by additional personal and ergonomic factors. The computer's visual effects, such as brightness, resolution, glare, and quality, are all recognized as contributors to computer vision syndrome (Loh & Reddy, 2008). Computer use has been linked to a higher risk of myopia progression, according to several studies (Liu et al., 2019; Liang et al., 2021). For example, a previous study indicated that using a computer for more than three hours a day was a high-risk factor for myopia in university students (Wang et al., 2017). According to Liu et al. (2021), the more time people spent on their computers, the more myopic equivalent spherical refraction and axial length they had. A study by Loh & Reddy (2008) showed a correlation between ocular symptoms such as pain, redness, dryness, blurred vision, double vision and other head and neck sprain before computer usage. In general, most symptoms associated with CVS may cause interruption of their work (Sheppard & Wolffsohn, 2018).

According to Ranasinghe et al. (2016), female gender, longer tenure of employment, higher daily computer usage, pre-existing eye disease, not using a VDU filter, wearing contact lenses, and knowing more about ergonomics practices were all linked to the occurrence of CVS. In addition, the duration of employment and pre-existing eye disease was related to the severity of CVS (Ranasinghe et al., 2016). The statement aligned with the finding, which found a link between educational attainment and CVS knowledge (Amirul et al., 2015). This could be because respondents with a higher education level would place a higher value on CVS expertise (Amirul et al., 2015). Based on a reported finding, it is known that there is an association between the level of knowledge, attitude, and the practice of using VDU and computer vision syndrome (Amirul et al., 2015). Currently, digital device usage has increased substantially nowadays, especially for both social and professional purposes. As a result, more significant CVS symptoms have been reported among university staff due to the prolonged use of VDU (Amirul et al., 2015). People with CVS may be affected by their level of knowledge, attitude, and practices of using VDU. However, there are limited studies on associations between knowledge, attitude, and practice of using VDU affect CVS among university staff. Herein, this study aims to determine the knowledge, attitude, and practice of using VDU affects CVS among office workers at UiTM Puncak Alam Campus.

Consequently, this study is designed specifically to uncover the causes of the occurrence of computer vision syndrome. This is important to give rise to improving awareness among office workers. A lot can be done to improve their knowledge and attitude on computer vision syndrome and to propound appropriate work ergonomics and eye care as the prevention. The high prevalence of CVS among office workers can be avoided by applying techniques that emphasise visual ergonomics and workstation adjustments (Zainodin & Abu Bakar, 2020).

3.0 Methodology

This study was conducted in a Malaysian public university, UiTM Puncak Alam. This studied population was chosen among the staff that uses the visual display unit during their working hours. A cross-sectional study was done to get all the required data from June until July 2022. The data was collected using a self-administered, validated, and pre-tested online questionnaire. The set of questionnaires was designed in both English and Malay language. There are four sections in the questionnaire. Section A was about the socio-demographic information and VDU usage history; section B contained questions on the knowledge of CVS of office workers; section C was about the respondents' attitude toward CVS, and section D was questioned on the preventive measures of CVS when using the visual display unit, such as the distance of the eyes from the computer screen and the viewing angle. This cross-sectional study used a self-administered questionnaire regarding UiTM Office workers' socio-demographic factors, knowledge, attitude, and practices while using the Visual Display Unit (VDU). Responses were analyzed using IBM SPSS statistics version 28.0 for Windows.

The sample size was calculated using the formula from Raosoft Software. After considering the 25% dropout rate, the final sample size was estimated at 230. The inclusion criteria were all permanent staff that worked continuously with computers for at least one year for

at least 3 hours every day (except for holidays) in the UiTM Puncak Alam campus. The exclusion criteria are a temporary UiTM staff, including subjects with symptoms and signs of CVS before their computer use, and anyone with ocular disease (i.e., glaucoma).

The self-designated questionnaire was translated by an English and a Malay language-qualified expert to ensure the words chosen are accurate, free of item construction problems, and grammatically correct content. It ensured that this questionnaire did not contain any content that may be perceived as offensive or biased by a particular subgroup of respondents. To ensure a valid questionnaire was distributed to respondents, a pilot study was conducted on 30 sample sizes to evaluate the face validity, administration process, and descriptive statistics (Lancaster et al., 2004; Saiful et al., 2021). Then, a reliability test was done, indicated by a high value of this questionnaire's internal consistency reliability coefficient measured using Cronbach's alpha coefficient (α). more than 0.852. After creating the reliable questionnaire, final amendments were conducted, ensuring the instructions and answer/response sheets were satisfactory and standardized scores were interpreted intuitively. The validated pre-tested questionnaire was used in this study and distributed via e-mail to all staff in UiTM Puncak Alam. The e-mail address was obtained from the UiTM staff directory's official website. During the data collection period, questionnaires were distributed to all staff that fulfilled the inclusion criteria of the sampling population. Staff who refused to participate in the study were excluded. Before distributing the questionnaire, respondents' consent was also obtained, and they were assured that all data and information would be kept confidential and meant for research purposes only.

All data were analysed using the SPSS Version 28.0 (Social Package for Social Science Version 28.0), a Predictive Analytic Software. A chi-square test was conducted. A p-value of less than 0.05 was used for the level of significance to determine the association between the variables.

4.0 Findings

4.1 Demographic data

A total of 254 office workers participated in this study (response rate=18.5%). The vast majority of participants were female (63.4%), and participants mainly were (9.1%) aged 39 years old. Among the surveyed office workers who were occupationally using the visual display unit, 50.8% worked with computers between 11-20 years. Most respondents (48.0%) used computers or laptops more frequently for work purposes, and the rest (52.0%) used smartphones or tablets or all the stated VDU more frequently. The majority of the respondents (65.4%) have refractive errors. The socio-demographic characteristics of participants are shown in Table 1.

Table 1. Sociodemographic data of participants

Characteristics	Frequency (%)
Gender	
Male	93 (36.6%)
Female	161 (63.4%)
Refractive error status	
Yes	166 (65.4%)
No	88 (34.6%)
Type of frequent digital screen use	
Computer/laptop	122 (48.0%)
Smartphone	45 (17.7%)
Tablet	1 (0.4%)
All of the above	86 (33.9%)
Years working with computer	
≤10 years	69 (27.2%)
Between 11-20 years	129 (50.8%)
≥21 years	56 (22.0%)
Occupational use of computer	
≤4 hours/day	44 (17.3%)
≥4 hours /day	210 (82.7%)

4.2 Level of knowledge, attitude, and practice on CVS among office workers

Figure 1 shows the office workers' knowledge of computer vision syndrome. Most office workers (76.4%) know prolonged computer digital screen usage can lead to computer vision syndrome (CVS). More than half of the office workers (76.0%) and (68.9%) know that practicing good computer ergonomics can reduce discomfort and risk of injury due to work and the importance of taking regular screen breaks to prevent eye strain. Generally, the office workers knew that the distance between the center of the computer screen and the eyes should be more than 50cm, and the top line of the computer screen should be below eye level.

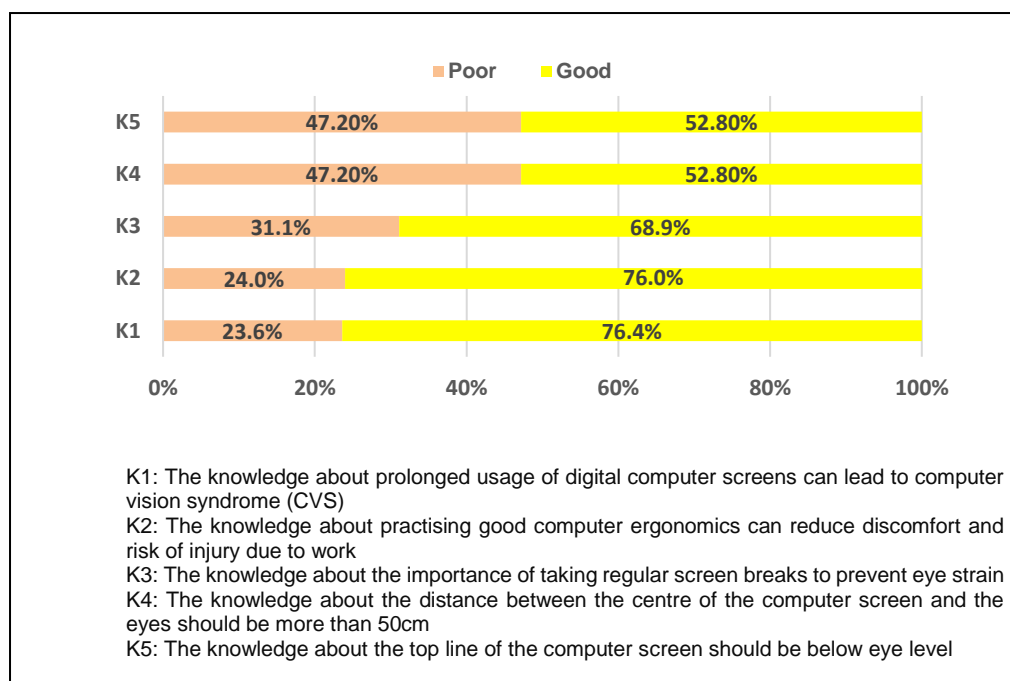


Fig. 1. Level of knowledge on CVS among office workers

4.3 Level of attitude on CVS among office workers

Office workers' attitudes towards computer vision syndrome were explored and summarised in Figure 2. Most office workers (93.7%) are willing to practice proper workplace ergonomics to improve their quality of life, and (90.9%) believe that keeping an acceptable distance between the center of the computer screen and the eyes can help to reduce eye strain. Only a few office workers refused to practice proper workplace ergonomics to improve their quality of life (2.4%), and 5.1% of office workers disagree that prolonged hours of digital screen usage can affect lifestyle and health. Overall, the office workers were moderately ready to improve their attitude towards computer vision syndrome (CVS). Still, some (12.2%) refused to decrease screen usage hours to protect them from CVS.

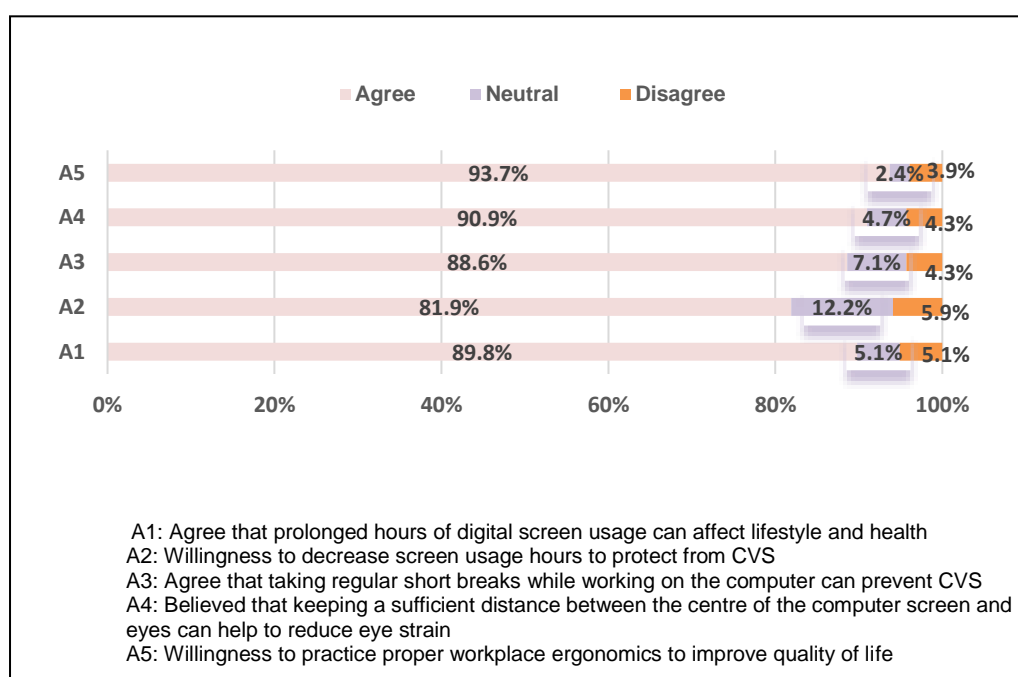


Fig. 2: Level of attitude on CVS among office workers

4.4 Level of practice on CVS among office workers

Based on the analysis of the responses (Figure 3), most of them will ensure proper and adequate lighting at the workstation to provide good visual comfort (94.9%) and take regular short breaks while working for prolonged hours (75.2%). The top line of the computer screen is below eye level (66.5%).

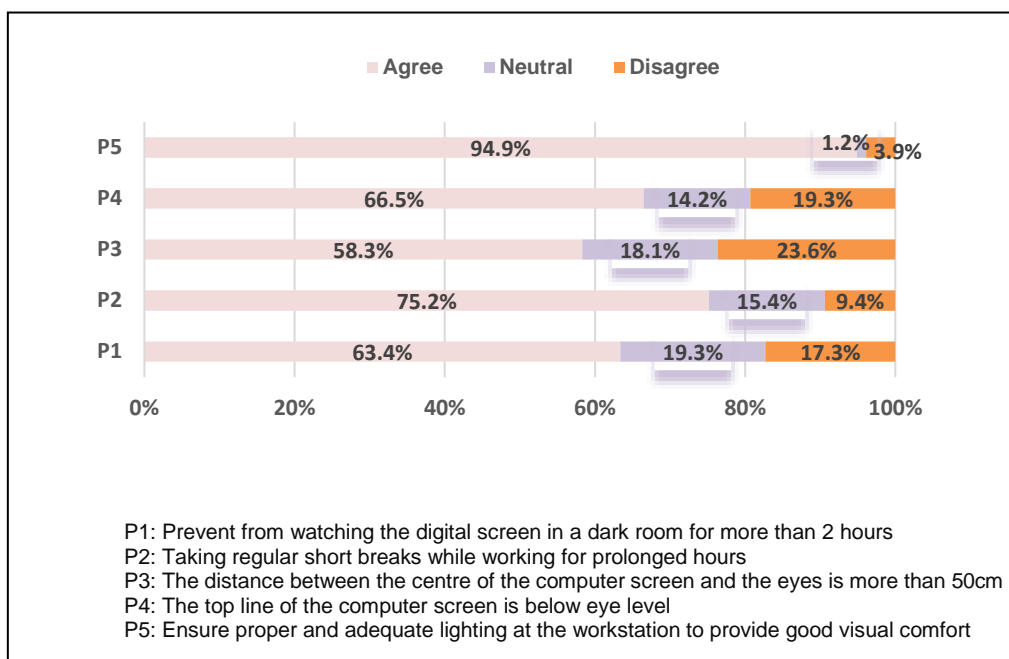


Fig. 3: Level of practice on CVS among office workers

4.5 Association between demographic predictors with knowledge, attitude, and practice on CVS among office workers

The chi-square independence test showed that gender proportions differed significantly between different levels of knowledge on CVS ($p < 0.05$) (Table 2). Females showed to have more knowledge of CVS rather than males $X^2 (1, N=254)=14.67, p < 0.05$. Therefore, there was a significant association between gender towards their knowledge of CVS. Then, it was found that there was a significant relationship between the years of the office worker working with computers and the knowledge level of CVS, $X^2 (2, N=254)=9.64, p < 0.05$. Office workers who worked with computers for more than 21 years were more likely to have more CVS knowledge than office workers who worked for less than 10 years. Besides, the Chi-square independence test was also performed to assess the relationship between the refractive status of the office workers and their knowledge level on CVS. It was found that there was not a significant relationship between the two variables, $X^2 (1, N=254) = 3.35, p > 0.05$. Office workers that have refractive errors were not likely to have more knowledge on CVS, along with office workers with no refractive errors.

Table 2. Demographic predictors towards knowledge on CVS

Demographic	Good knowledge (%)	Poor knowledge (%)	X^2 statistic (df)	P-value
Gender				
Male	48 (51.6%)	45 (48.4%)	14.67 (1)	.001*
Female	121 (75.2%)	40 (24.8%)		
Years working with computer				
10 years and below	36 (52.2%)	33 (47.8%)	9.64 (2)	.008*
Between 11-20 years	90 (69.8%)	39 (30.2%)		
21 years and above	43 (76.8%)	13 (23.2%)		
Refractive error status				
Has refractive error	117 (70.5%)	49 (29.5%)	3.35 (1)	.067
No refractive error	52 (59.1%)	36 (40.9%)		

Other than that, to assess the relationship between the gender of the office workers and their practice of using VDU on CVS, the chi-square test of independence was performed (Table 3). It was found that there was not a significant relationship between these two variables, $X^2 (2, N=254)=4.41, p > 0.05$. Furthermore, it was found that there was a significant relationship between the years of the office worker working with computers and the practice of using VDU on CVS, $X^2 (4, N=254) = 19.09, p < 0.05$. Office workers that worked with a computer for 11 to 20 years (79.1%) and 21 years and above (85.7%) are likely to have a proper practice of using VDU compared to office workers that worked for less than ten years. Besides, it was found that there was a significant relationship between the office worker's refractive status and the practice of using VDU on CVS, $X^2 (2, N=254) = 6.37, p < 0.05$. Office workers with refractive errors were more likely to practice using VDU properly than those without refractive errors.

Table 2. Demographic predictors towards practice on CVS

Demographic	Good practice (%)	Neutral practice (%)	Poor practice (%)	X ² statistic (df)	P-value
Gender					
Male	79 (84.9%)	7 (7.5%)	7 (7.5%)	4.41 (2)	.11
Female	120 (74.5%)	26 (16.1%)	15 (9.3%)		
Years working with computer					
10 years and below	49 (71.0%)	6 (8.7%)	14 (20.3%)	19.09 (4)	.001*
Between 11-20 years	102 (79.1%)	22 (17.1%)	5 (3.9%)		
21 years and above	48 (85.7%)	5 (8.9%)	3 (5.4%)		
Refractive error status					
Has refractive error	135 (81.3%)	22 (13.3%)	9 (5.4%)	6.37 (2)	.041
No refractive error	64 (72.7%)	11 (12.5%)	13 (14.8%)		

The Fisher-Freeman-Halton test showed that there was statistically significant association between years working with computers and refractive error status towards attitude on CVS ($p < 0.05$). However, there was no statistically significant association between gender and attitude on CVS ($p > 0.05$).

5.0 Discussion

5.1 Level of knowledge, attitude, and practice of using VDU on CVS

The vast majority of participants in this study population were female, and the mean age was 39 ± 8 years old. It showed that women dominated computer-based work in general. According to age distribution data, most office workers in a developing country were 30.8 ± 8.1 years (Ranasinghe et al., 2016). About 50.8% of office workers worked with computers between 11 and 20 years. This is in accordance with a study by Ranasinghe et al. (2016) discovered that the occurrence of CVS among office workers in the developing country of Sri Lanka is due to a longer duration of occupation, higher daily computer usage, and female gender.

In this study, the good knowledge group scored twice as high as the low knowledge group. This is in accordance with a study by Amirul et al. (2015), which reported that most Malays office staffs at public university in Malaysia have a higher level of CVS knowledge (61.6%) compared to other ethnicities. In contrast, Akinbinu and Mashalla (2012) conducted a study investigating the knowledge of CVS among computer workers, and they found that only 27% of computer users in the workplace in Abuja, Nigeria had a strong understanding of CVS. In addition, the study also reported that there was a significant knowledge gap in the studied population and possibly in the broader population.

For the attitude towards CVS, it has been observed in this study that a significant percentage of the respondents were aware of the condition of CVS. This finding is consistent with a study by Bali et al. (2007) asserted that all respondents were aware of CVS. In addition, a previous study reported that the majority of staff (52.3%) that use VDU in a public university in Malaysia have a good attitude toward CVS (Amirul et al., 2015). It is possible because some organisations might offer various educational programs to inform computer users about visual hygiene and CVS awareness.

Most of the staff in the faculty of Malaysia public university had a good level of practice in VDU usage (Amirul et al., 2015). However, a study by Stella et al. (2007) at the University of Benin, Nigeria revealed that only 32.0% of the respondents had implemented their knowledge of CVS prevention strategies. The results of good practices while using VDU in this study could be related to the intergenerational difference between today's generations and those in the past. This could be explained by the efficiency and accessibility of explicit knowledge intake offered by mass media, publications, internet networks, and other sources where they can utilise the knowledge they received in their everyday routines while using VDU.

5.2 Association between demographic predictors towards knowledge, attitude, and practice on CVS

This study found that the CVS was significantly associated with the female gender (Ranganatha & Sheetu, 2019; Mohammed Alhibshi et al., 2021). This is related to a study among staff workers in a public university, Malaysia by Zainuddin & Muhammad Isa (2014) that reported a significant association between gender and their knowledge of visual ergonomics, where male staff had poor knowledge of visual ergonomics compared to females. However, from the study by Mersha et al. (2020), no significant association was found between gender and CVS among bank workers in Gondar City in Northwest Ethiopia. This may be due to the more significant proportion of female staff in this studied population that contributes to a high level of knowledge among female office workers.

Furthermore, this study revealed that office workers who worked with computers for more than 21 years were more likely to have more knowledge of CVS than those who worked with computers for less than 10 years. Therefore, this study is comparable to research by Akinbinu & Mashalla (2013), which reported that about 49% of the studied population among computer users in the workplace in Abuja, Nigeria, have been using the computer for more than six years. This can happen because more prolonged exposure to VDU can increase the risk of CVS among office workers. The more years of computer use, the more the CVS symptoms experienced (Akinbinu & Mashalla, 2013). The study has further shown that respondents using a computer for less than one-year experienced minor symptoms compared to respondents who have been using the computer for between six and more than eight years.

However, our study further showed no significant association between the refractive error status of respondents and their knowledge level of CVS. The vast majority of respondents in this study with refractive errors were not likely to have more knowledge of CVS and office workers with no refractive errors. The correction of refractive errors and presbyopia is considered an essential factor in ensuring subjective visual comfort and decreasing self-reported symptomatology by VDU workers (Shrestha et al., 2020).

In this study, there were associations between years working with computers and refractive error status with practice on prevention of CVS. A study revealed that the university students in Asante Akyem Campus, Ghana, generally had almost ten years of working experience with the computer; however, more than half of the respondents had CVS (OseiFrimpong & Asare., 2020). Thus, prolonged and continuous computer use usually may lead to CVS and can result in low work productivity (OseiFrimpong & Asare., 2020). In addition, respondents in this study that have refractive error are primarily aware of their attitude toward CVS. In fact, more than half of office workers with no refractive error are also conscious of their attitude toward CVS. The vast majority of office workers pay attention to their attitude toward CVS despite having or not having the refractive error.

However, this study's findings showed no significant association between gender and the practice of using VDU on CVS. This is not in accordance with a study among computer office workers in Sri Lanka by Ranasinghe et al. (2016); they reported that knowledge of female gender and ergonomics practices were significantly associated with an increased risk of developing CVS. The difference between this finding and others may be due to the level of awareness in this studied population. Thus, regardless of gender, office workers were practicing excellent workplace ergonomics as a routine.

6.0 Conclusion& Recommendations

The office workers that use VDU have excellent knowledge, attitude, and practice about CVS preventive measures. Chi-Square tests from this study revealed a strong relationship between gender and years of computer experience toward the level of CVS. Furthermore, there was a significant association between years working with computers and respondents' refractive error status with their attitude toward CVS. Additionally, there is a significant association between years spent working with computers and refractive error status towards their practice in preventing CVS.

It is suggested that future studies on the effectiveness of practice related to preventing CVS symptoms use a larger sample size from diverse populations to provide more significant statistical reliability and promote good practices of using VDU. All VDU users should get education and training about CVS preventative measures to improve their knowledge, attitude, and practices on CVS. By doing so, the occurrence of CVS can be reduced. Feasibly in the future, a suitable adjustment to the working environment's ergonomics can be created by an expert to reduce computer vision syndrome.

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Paper Contribution to Related Field of Study

This study contributes to understanding the knowledge, attitude, and practice of CVS and the association between knowledge, attitude, and practice of using VDU on CVS among office workers. This is important to give rise to improving the awareness among office workers. A lot can be done to improve their knowledge and attitude on CVS and to propound appropriate work ergonomics and eye care as the prevention.

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