

Full Length Research Paper

Knowledge of computer vision syndrome among computer users in the workplace in Abuja, Nigeria

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Quantitative, descriptive, cross-sectional study was conducted to determine the level of knowledge and extent of computer vision syndrome (CVS) among computer users at the Securities and Exchange Commission (SEC), Abuja, Nigeria. Structured questionnaire was administered to 100 computer users aged between 18 and 40 years. The findings showed that 40% of the participants were aware of CVS; of which 27% had knowledge of the disorder. CVS was common among the employees, 74% of the respondents experienced at least one symptom of CVS. Headache and eyestrain were the most common symptoms of CVS among the studied population. The study concluded that there is a serious knowledge gap about CVS in the studied population which suggests a similar knowledge gap in the general population. It is recommended that further studies on a large scale should be carried out to explore the extent and knowledge about CVS in the developing countries for the purpose of designing strategies for bridging-up the knowledge-gap and minimize the impact of CVS on the people at risk.

Key words: Computer vision syndrome, knowledge, awareness, computer users.

INTRODUCTION

When the first IBM personal computer was manufactured in 1981, the company did not envisage the possible potential health hazards the users may consequently experience (Mvungi et al., 2009). Today, a condition known as computer vision syndrome (CVS) is common to millions of computer users around the world. At present, a large number of computer users suffer from CVS (Ihemedu et al., 2010; Sen and Richardson, 2007; Torrey, 2003). In the USA more than 143 million Americans work on a computer each day with an estimated 90% suffering from computer eyestrain. Additionally, almost 90% of children in the USA work on a computer at home or in school every day (LFV, 2007; Vision Council (VCA), 2007).

CVS remains an underestimated and poorly understood condition at the workplace (Izquierdo et al., 2004; Izquierdo, 2010). About 70% of computer workers worldwide report having vision problems and there is an

alarming increase in the number of people affected (Blehm et al., 2005). CVS is caused by the eye and brain reacting differently to characters on the screen than they do to printed characters. The computer screen constantly refreshes at a certain rate whereas paper is steady and the characters on a computer screen lack the contrast or well defined edges that printed characters have. Therefore, the colour intensity of digital characters diminishes around the edges making it difficult for eyes to remain focused. Having to continuously refocusing on digital text fatigues the eyes and can lead to burning or tired eyes (Blehm et al., 2005; Anshel, 2005). The condition is marked by symptoms such as eyestrains, burning sensation, blurred vision, gritty sensation, headache and neck pains. Some computer users may experience continued reduced visual abilities such as blurred distant vision even after work (Chiemeke et al., 2007). The symptoms may be aggravated by

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poor lighting, glare, improper work station set up and uncorrected refractive errors (Ihemedu and Omolase, 2010; Torrey, 2003).

In Africa, not many studies on CVS have been carried out in spite that computer use has attained a significant patronage especially with the upsurge of information and communication technology. Consequently, many organisations can barely manage their businesses without the computer. Poor publicity and utilisation of preventive measures however, have hampered the effectiveness of computers due to the overwhelming symptoms experienced by some users (Ihemedu and Omolase, 2010). Awareness of visual problems from computer use has also been minimally stressed in most industrially developing countries like Nigeria (Chiemeke et al., 2007). Some researchers (Divjak and Bischof, 2009; Mvungi et al., 2009) have explained that CVS can be avoided by suitable preventive actions, but majority of the sufferers are ignorant of this. In the basis of this, some eye care professionals have referred to CVS as the number one occupational epidemic of the 21st century (Graney, 2011; Torrey, 2003).

A study by Chiemeke et al. (2007) in Benin, Nigeria tested the respondents' knowledge on computer ergonomics and preventive measures of CVS. Results from the study showed that only a small percentage (32%) of the respondents was aware of preventive measures for visual symptoms, while a minority (1%) had former ergonomics guidelines/policies at their workplace. Similar studies in South-West Nigeria (Ihemedu et al., 2010) show that a large number of respondents were aware of various types of computer shields but only a few utilised the shields. Studies from other parts of Africa show that most problems associated with computer use are caused by insufficient knowledge about safe computer usage (Mvungi et al., 2009).

Mounting evidence shows that CVS can significantly harm workplace productivity, as it places an unusual strain on the human physical well-being thereby reducing the quality of life (Torrey, 2003). Previous studies (Izquierdo et al., 2004; Chiemeke et al., 2007; Divjak et al., 2009) have demonstrated a direct correlation between proper vision correction and the time required for a computer worker to complete a task; and that productivity is reduced even more among computer users who were unaware that they had vision problems. CVS is therefore a significant public health problem as it affects computer users from all walks of life (Torrey, 2003).

The main purpose of the study was to assess the knowledge of computer users about CVS in a workplace in Abuja, Nigeria. The study specifically explored the level of knowledge and awareness about CVS among computer users and determined the extent of CVS by assessing the visual symptoms among the study population. This study aims to contribute evidence-based information on CVS in Nigeria and the findings would assist employers and other stakeholders to develop strategies that will be used to reduce the effects of CVS

in the selected population. Training institutions and health educators will find the results of this study useful in developing and revising training curricula that will enhance knowledge and level of awareness of CVS among computer users in Nigeria.

METHODOLOGY

A quantitative, descriptive cross-sectional study was conducted to assess the level of knowledge about CVS and its preventive measures among the staff members of the Securities and Exchange Commission (SEC), Abuja. The study population included both male and female adults (18 to 40 years) working at the SEC office. Simple random sampling was used to select the study sample from the sampling frame by assigning numbers to the sampling frame then numbers were randomly selected to obtain the study sample. Data was collected with the help of two research assistants using a semi-structured questionnaire containing 22 items developed by the researcher using question items from previous studies (Onunkwor, 2011). The research instrument was pre-tested on respondents from the Central Bank of Nigeria, Central Area, Abuja who were comparable to the sample of correspondents, but were not part of the main study. Data was analysed using Epi-info version 7 (2011) software. Descriptive statistics was used to organise, describe and synthesize the data generated in order to facilitate understanding about knowledge on CVS and inferential statistics was used to test the relationship between knowledge of CVS and demographic factors such as age, gender and level of education. Univariate chi-square tests were used for data analysis. A two-tailed 'p' value of less than 0.05 was considered statistically significant. Permission to carry out the study at the site was given by the SEC in Abuja and the study received ethical clearance DIS 4986 from the University of South Africa (UNISA) Health Studies Higher Degrees Committee.

RESULTS

Data was collected from 100 (54 male and 46 female respondents) employees of the SEC, Abuja over a three-week period from December 2011 to January 2012. The age distribution of the respondents is presented in Table 1. Most employees (84%) were between the ages of 25 and 39 with a mean age of 31 years.

Figure 1 presents the average number of hours respondents spend on the computer daily. Most respondents (45%) spend 6 to 8 h on the computer daily, followed by those who spend 3 to 5 h (33%), more than 8 h (17%) and 1 to 2 h (4%). No respondent indicated less than 1 h.

The duration of computer use is as shown in Figure 2. Only 6% of the respondents had used the computer for less than 1 year; 15% had been using the computer for between 1 and 2 years; 28% have used the computer for duration of 3 to 5 years. About 29 and 20% have been using the computer for between 6 and 8 years, and more than 8 years, respectively.

In this study the term 'awareness' was used to mean having heard of CVS. Respondents' were asked the question 'are you aware of a condition called computer vision syndrome?' One respondent did not answer this

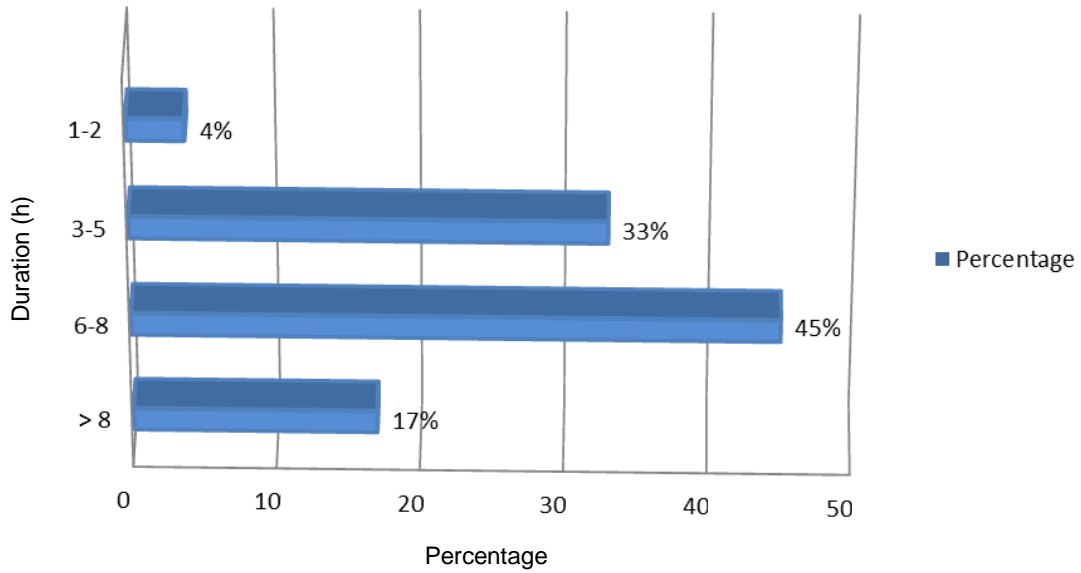


Figure 1. Bar chart showing the average hours spent by SEC, Abuja, Nigeria employees on computer daily.

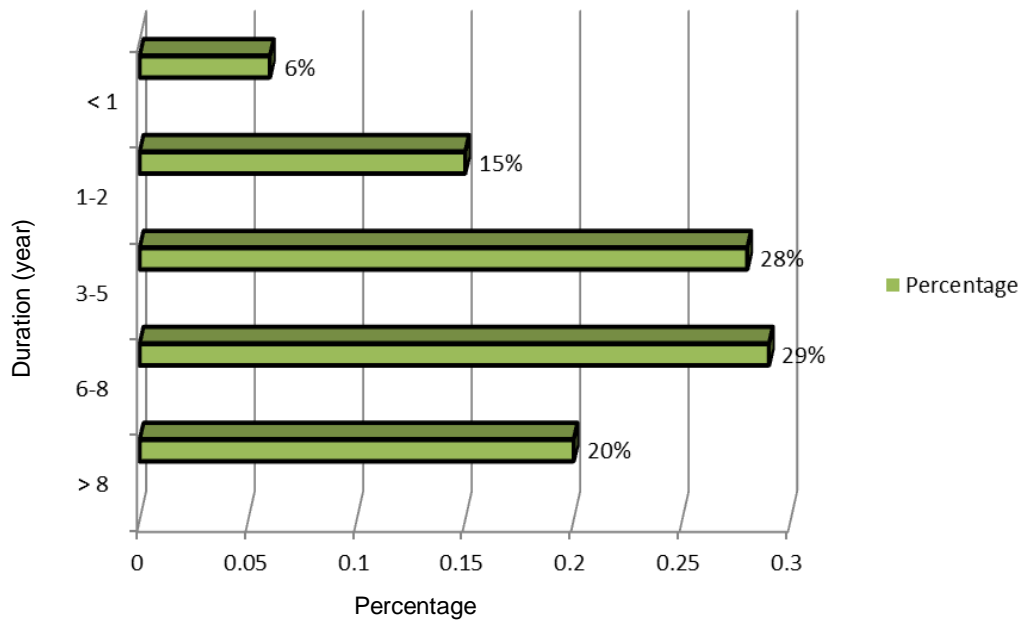


Figure 2. Bar chart showing the duration of computer use by SEC employees, Abuja, Nigeria.

question, 40 admitted to be aware of the syndrome and about 60% had not heard of CVS.

Knowledge of CVS in this study is defined as acknowledging having some understanding of CVS by selecting the options presented in Table 2. Out of the 40 respondents that indicated 'yes' to the awareness of CVS, 2 respondents (5%) indicated option (i), 1 respondent (2.5%) indicated option (ii), 27 respondents (67.5%) indicated the correct option (iii), and 10 respondents

(25%) indicated option (iv). The knowledge about CVS was increasing with age, with the age group 35 to 39 years having the highest knowledge about CVS.

The frequencies of CVS symptoms experienced by the respondents are as shown in Figure 3. About 74% of the study population indicated 'Yes' to at least one symptom experienced during computer use; 25% indicated 'No' to all the symptoms and 1% did not indicate either 'Yes' or 'No'. The symptoms most experienced are headache

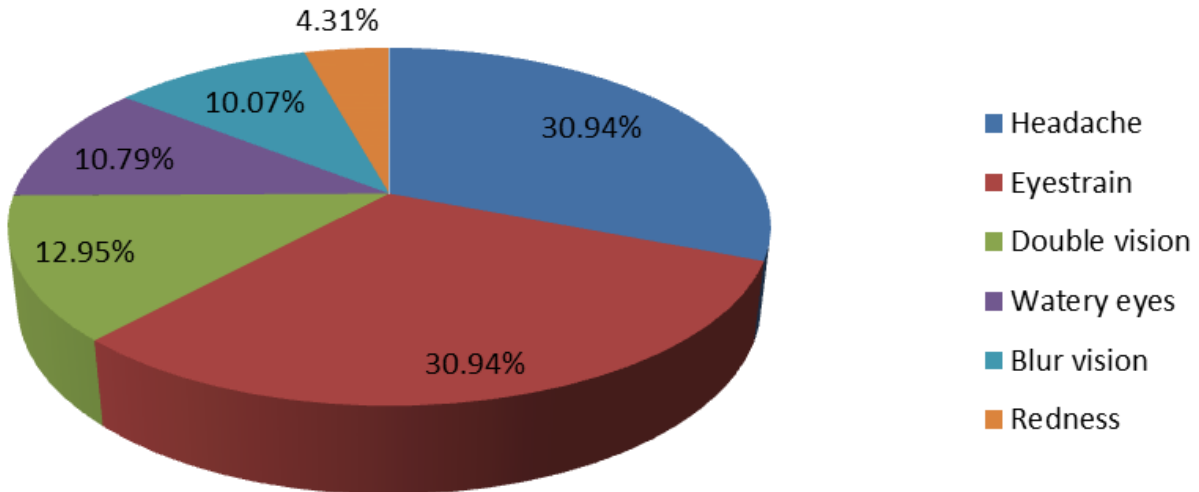


Figure 3. Pie chart showing the frequency of CVS symptoms among SEC employees in Abuja, Nigeria.

Table 1. The age distribution of the respondents from SEC, Abuja, Nigeria.

Age group (Years)	Frequency	%	Cumulative (%)
18-20	1	1	1
21-24	15	15	16
25-29	26	26	42
30-34	25	25	67
35-39	33	33	100
Total	100	100	-

Table 2. Level of knowledge about CVS among SEC employees, Abuja, Nigeria.

Options	Frequency	Percent (out of 40)	Overall (%)
(i) Tiredness during computer use	2	5	2
(ii) Wearing glasses while using the computer	1	2.5	1
(iii) Combination of headache, eyestrain and blur vision that occur as a result of prolonged computer use	27	67.5	27
(iv) I only heard of it, I don't know what it means	10	25	10

(30.94%) and eyestrain (30.94%). Double vision was experienced by 12.95%, watery eyes were reported by 10.79%, blur vision and redness were experienced by 10.07 and 4.31%, respectively.

The relationship between the average number of hours spent on the computer and CVS symptoms among the study population is presented in Table 3. CVS symptoms were reported more commonly among the employees who spent 6 to 8 h on the computer daily (48.9%) as compared to 23.7 and 0.72% among those who spend 3 to 5 h and 1 to 2 h, respectively. A similar trend is seen on the relationship between CVS symptoms and the duration of computer use.

Prevention of CVS is a priority in minimizing the impact of CVS on employee's productivity. Table 4 summarizes

the responses of the employees on the preventive measures. Taking regular breaks, regular eye checks and using computer glare screen were the commonest preventive measures which together accounted for 94.4%.

DISCUSSION

The 21st Century is characterised by rapid developments in information technology. With dependency on information technology, the computer has become a common tool in schools, colleges, universities and workplaces. According to the American Optometry Association, CVS is defined as "the complex of eye and vision problems

Table 3. The relationship between CVS symptoms and the average number of hours spent on computer by SEC employees, Abuja, Nigeria.

Duration (h)	No. of respondents	Headache	Eyestrain	Double vision	Redness	Watery eyes	Blur vision
1-2	4	-	1	-	-	-	-
3-5	33	8	15	3	2	2	3
6-8	45	24	16	12	3	7	6
>8	17	11	11	3	1	5	5
No answer	1	-	-	-	-	1	-

Table 4. The preventive measures of CVS as selected by the SEC employees, Abuja, Nigeria.

Option	Frequency	Percent
(a) Taking regular breaks	40	32
(b) Blinking frequently	7	5.6
(c) Checking eyes regularly	39	31.2
(d) Using glare screen on the computer	39	31.2

related to near work which are experienced during or related computer use" (AOA, 1995). Currently CVS affects millions of people globally (Sen et al., 2007; Rathore et al., 2011; Chakrabarti, 2007) and is increasingly becoming a public health concern. Different terms have been used to describe symptoms of CVS, such as visual discomfort, ocular disorder and visual difficulty. In general, the CVS symptoms can be divided into three categories (1) eye-related symptoms e.g. dry eyes, watery eyes, irritated eyes, (2) vision-related symptoms e.g. eye strain, eye fatigue, headache, blurred vision, and (3) posture-related symptoms e.g. sore neck, shoulder pain, sore back (Blehm et al., 2005; Shetty, 2000). Since CVS manifests with a variety of symptoms, researchers in optometry and ergonomics have developed diagnostic procedures and treatment including a comprehensive eye/vision examination of computer users at the beginning and on regular basis, on-site ergonomic evaluation and instruction on correct working habits, use of proper computer glasses, frequent breaks, training computer users to blinking frequently when using computers and administration of artificial tears usually resolve the problem of mild to moderate dry eyes (Acosta et al., 1999; Tsubota, 2002; Biswas et al., 2003).

Unfortunately, CVS has not been studied extensively in Nigeria and other developing countries. This study was carried out to explore the level of knowledge about CVS among employees of the SEC in Abuja, Nigeria.

It has been shown in this study that most employees use computers on daily basis and the duration of use ranged between 1 and more than 8 h per day. It has also been observed that CVS is common among the studied population with about 74% of the participants experiencing at least one of the CVS symptoms. The most experienced symptoms were headache and eye strain

which together accounted for 61.8%. Other symptoms reported were double vision, watery eyes, blur vision and eye redness. Our findings are in agreement with the report by Bali et al. (2007) who reported eyestrain (97.8%) and headache (82.1%) as chief presenting symptoms of CVS in their study population. Similarly, the findings in this study concur with the findings by Chiemeke et al. (2007) who reported eyestrain as being the most common visual symptom experienced by computer users. They also reported blurred distance vision, headache, double vision and redness of eyes as other common visual symptoms associated with computer use.

It has been observed in this study that respondents that spend 6 to 8 h average daily on the computer experience more CVS symptoms (48.9%), followed by respondents that spend more than 8 h daily (25.9%) and 23.7% by respondents that spend 3 to 5 h daily on the computer. Respondents that spend 1 to 2 h daily experience the least symptoms of CVS (0.72%). This finding is similar to previous findings (Ihemedu et al., 2010) who reported that more symptoms were noticed amongst the computer users in the university and hospital as compared to the bankers who tend to spend longer time on computers. Our study has further shown that the longer the duration in years of computer use, the more the CVS symptoms, because respondents that have been using computer for less than 1 year experienced the least symptoms (1.4%) when compared with those who have been using computer for between 6 and more than 8 years (31.7%). The findings support that the symptoms are related to computer use and can be experienced from use of computer at short period of between 1 and 2 h. The reduced number of symptoms among employees using the computer for more than 8 h can be explained by

possibly some forms of compensatory mechanisms to chronic exposure that occurred resulting in loss of sensitivity and the employee responds less.

Sufficient knowledge about CVS and its preventive measures would help reduce the incidence in a population. Extensive literature search did not reveal any publication on knowledge of CVS, thus making comparison with other results difficult. Chiemeke et al. (2007) reported that 32% of the respondents in their study were aware of preventive measures for computer-related visual symptoms. While majority of the participants in this study were literate, the level of knowledge about CVS was very low (27%) suggesting a serious knowledge gap exists about CVS in the studied population and possibly in the general population. The respondents indicated the possible causes of the symptoms include tiredness during computer use and an indication to wear spectacles. Taking regular breaks, regular eye sight checks and using glare screen on computer were selected by the participants in the study as the most commonly used preventive measures. However, and interestingly, frequent blinking is much more easily applicable was least considered to be preventive.

CVS has been classified as the number one occupational hazard of the 21st Century (Torrey, 2003). This observation cannot be overemphasized when considering the upsurge in information technology, proliferation of computer systems, dependency on the computer for daily operations and occurrence of CVS among employees. It is so now, because in 2000 it was reported that more than 75% of daily activities of all jobs involve the use of the computer (Ihemedu et al., 2010).

CVS significantly impairs workplace productivity and reduces the quality of life by placing unusual strain on the human physical well-being. Unfortunately, both the level of awareness and knowledge of CVS among the studied population were unsatisfactory at 40 and 27%, respectively. It is recommended that further studies be carried out on a large scale to determine the extent of the CVS problem among employees at workplaces including schools, colleges, higher education institutions, government departments and the private sector in Nigeria. It is envisaged that such evidence-based information will be used by stakeholders to raise awareness about CVS among the workforce and for designing intervention strategies to reduce the impact of CVS at workplaces.

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