Original Research Paper

Healthcare

CORRELATIONAL STUDY OF COMPUTER VISION SYNDROME WITH DEVICE BRIGHTNESS MODE

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ABSTRACT The aim and purpose of this survey based study was to correlate computer vision syndrome with the digital device's brightness mode. In this cross-sectional questionnaire based study, 126 subjects (Optometry students) were enrolled by non-probability convenience sampling procedure and all were subjected to the structured questionnaire and the responses were recorded & evaluated to know the correlation with the brightness mode. It was found that out of 126 subjects (Males=61 & Females=65), 81 (=64.3%) were suffering from CVS and those subjects who were using the visual devices on the auto brightness mode had suffered less (19.8%) from CVS than that those using manual brightness mode (69.1%) and both (alternate) modes (11.1%). Most commonly experienced symptom was Headache (64%, p<0.05) while Dry eyes (16%) symptom was the least commonly experienced symptom. Persons who continuously use computer for long hours on auto brightness mode were found to have less severe CVS.

INTRODUCTION

Computer and other visual devices are now an essential part of our daily life. With the increased use, a very large population is experiencing ocular symptoms such as dry eyes, watery eyes and redness of the eyes. Collectively, all such computer related symptoms are usually referred to as Computer Vision Syndrome (CVS).

Having the symptoms of computer vision syndrome either intermittently or continuously for at least one week during the last 12 months was defined as CVS. Presence of pain in and around the eyes, headache, blurred near vision, blurred distant vision, red eyes, dry eyes, sore/irritated eyes, excessive tearing, double vision, twitching of eyelids, and changes in visualizing colors were assessed as symptoms of CVS in this study. The worker who reported one of the above symptoms was considered as positive for CVS.[1,2,3,4]

The aim and purpose of this survey based study was to determine the prevalence of CVS and correlate computer vision syndrome with the digital device's brightness mode.

When viewing near object; miosis, accommodation and convergence take place simultaneously. Prolonged work at computer terminals has been associated with changes in both relative accommodation and vergence. So, it is essential to keep following points into account while using computer and other digital devices.

1- Prefer to use a chair specially designed for computer use so that it provides necessary support to back, legs, buttocks and arms.
2- Use the key boar d in such a p osition that arm and the wrist are in neutral position.
3- The monitor should be kept in fron t o f user chair & below eye-level so that the head, neck and body face forward when viewing the screen.

Table -1.The commonly used eyes distance for the electronic devices.[5]

DEVICE NAME	DISTANCEFRO MEYES
Digital Gadgets (Mobile phone, iPAD, Tablet)	Onefoot (30-40cm)
Laptop and Desktop Devices	Two and ahalffeet
Television (24"to40"screen)	10 feet

MATERIAL & METHODS

A cross-sectional questionnaire based study was conducted in the Department of Optometry, Faculty of Paramedical Sciences, UPUMS, Saifai (Etawah) during the month of March-May, 2019. 126 consecutive subjects (Optometry students) were enrolled (regardless of age, gender and their visual status) by non-probability convenience sampling procedure and all were subjected to the structured questionnaire and the responses were recorded & evaluated to know the correlation with device's brightness mode.

The questionnaire evaluated personal, environmental, ergonomic factor, and physiological response of computer users.

During evaluation following question were asked from the subjects-
1. How many hours you use mobile/laptop daily?
2. How many times you take break while using mobile/laptop?
3. What's your sitting position/posture?
4. What is the Brightness level or mode of visual devices?
5. What's the working distance from device?
6. Which type of spectacles lenses (with/ without coatings) you use while working on mobile/laptop?
7. What Type of content seen on the screen of mobile?
8. Any Ocular/ Periocular/ Ergonomical problem?
9. What font size set on your screen of mobile?
10. Measurement of problems?

The data was analyzed with the help of SPSS version 21. The descriptive data was presented in percentage. The Chi-square test of significance was used for analysis of categorical value.

RESULTS

It was found that out of 126 subjects (Mean age=21.3±2.3 years), 81 (=64.3%) were suffering from CVS and remaining 45 (=35.7%) were normal. The common symptoms included headache, neckache, blurred vision, eye strain, tired eye & watery eyes were observed. It was found that who were using the visual devices on the auto-brightness mode suffered less (19.8%) from CVS than those using the manual-brightness mode (69.1%) or both (alternate) modes (11.1%).

Based on this data, it was found that the age group 19-22 was suffering more from CVS. Out of 126 subjects 91 subjects were of the age group of 19-22 out of which 60 i.e. 47.6% were suffering from CVS. The Basic reason behind this probably is the people of this age group are more addicted to visiting social sites and spent more time on social media. Another reason behind this is keeping wrong posture while using devices which would have led to symptoms of CVS like neck pain, headache, etc.

Another survey was done based on the data collected from subjects and it was found that the most prominent symptoms of CVS in this survey were Headache (64%), and other symptoms were watery eyes (31%),eye strain (36%) and neck pain (42%) while Dry eyes (16%) ,blurred vision (17%) and tired eye (52%) were the least commonly experienced symptoms.

Symptoms (Headache, Neck Pain, Tired Eyes) was statistically significant at the level of p<0.05, as a cause of CVS.

DISCUSSION

Now-a-days modern life style obliged the whole world to shift to the modern technology where the digital screens are the masterpiece of this life process. The emergences of portable and hand held digital

screen have multiplied the number of devices used by human kind hundreds of times. In the last decade, the emergence of the social media and its application such Facebook, WhatsApp, Instagram and Twitter etc. have made a revolution in the life style of all mankind and has shifted his interest towards entertainment, communication and watching audio-video media that unfortunately have been consuming most of his spare time on smart phones and digital screen.[7]
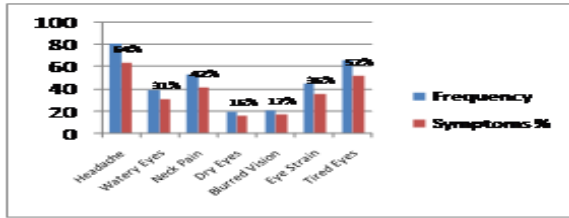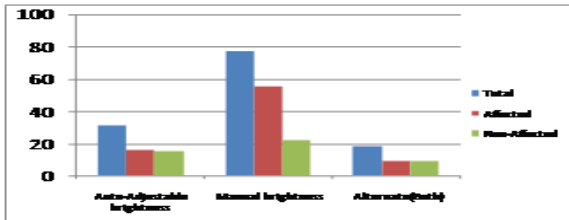

Figure-1. CVS Frequency and Symptoms

Figure-2. Percentage of student s affected from CVS

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The U.S National Institute of Occupational Safety and Health (NIOSH) defined CVS as "eye strain associated with prolonged computer use". And the American Optometric Association (AOA) expanded this definition to those "eye and vision-related problems related to near work which are experienced during or related to computer use.[7]

CONCLUSION

Persons who continuously use computer for long hours were found to have more severe problem of vision. While diagnosing the near work related problem/ CVS, we have to consider all the aspects like Ocular, Extra-ocular, Ergonomic and work place related modification.

It is preferred to use display brightness on the Auto-adjustable mode while using digital devices because this mode adjusts the brightness according to the lighting conditions thus causing less reading issues, but manual mode of brightness is not helping in that manner as this mode has fixed brightness level for all situations unless it is customized.

Treatment of CVS involves proper identification of the etiologic factors and correction of visual errors if exists. Special attention should be paid to ergonomic factors like correct posture in chair, lighting arrangement, antiglare screen on the computer/laptop, follow up 20-20-20 rule[8] and proper working habits which requires management by multidirectional approach combining ocular therapy (Orthoptic Eye Exercises) and Physiotherapy while adjustment of the work station and regular work breaks may help improve visual and body comfort.

Table 2. Comparison of various research studies of CVS

Present Study	Ethiopia Study[6]	Nepal Study[7]
1. Cross-sectional survey based study; (March-May 2019)	Cross-sectional study (February-March 2016)	Descriptive study; (June 2018)
2. 126 subjects with 64% of CVS prevalence	607 participants 69.5% of CVS prevalence	100 medical students with 74% of CVS
3. Most common symptom: Headache (64%) while least common was dry eyes (16%)	Most common symptom: eye-strain (47%) while least common was dry eye (22%)	Most common symptom: Eye strain (89%) while least one was dry eye (71%)
4. Auto brightness mode less suffered (19.8%) from CVS than the manual brightness mode (69.1%) ones.	Brightness mode of visual devices was not included.	Brightness mode of visual devices was not included.
5. Data analysis performed using SPSS version 21 & Chi-square test Symptoms (Headache, Neck Pain, Tired Eyes) were statistically significant (p <0.05), as a cause of CVS.	Analysis was performed using SPSS version 20. Significance level was obtained at 95% CI and p value<0.05.	Data analysis was done using SPSS statistics version 25.

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