EYE HEALTH IN A CHANGING WORLD

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TITLE: Impact of screen brightness of the digital devices on Computer Vision Syndrome

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 or CVS.[1,2,3,4]

CVS can reduce productivity in school children's work by as much as 20%.

CVS is the physical eye abnormality felt by many individuals after 2 hours or more hours. in front of digital screen

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 provide necessary support to back, legs, buttocks and arms.
2- Use the keyboard in such a position that arm and the wrist are in neutral position.
3- The monitor should be kept in front of user`s chair so that the head, neck and body face forward when viewing the screen.

The U.S. National Institute of Occupational Safety & Health (NIOSH), defined the CVS as " Eye strain associated with prolonged Computer use" and American Optometric Association (AOA), expanded this definition to those " Eye and vision related problems related to near work which are experience during or related to Computer use".[8]

DEVICE NAME	DISTANCE FROM EYES
Digital Gadgets(Mobile phone, IPAD, Tablet)	One foot (30-35cm)
Laptop and Desktop Devices	Two and a half feet
Television	10 feet

Table 1. The commonly used eyes distance for the electronic devices

Aim/Purpose

The aim and purpose of this survey based study is to determine the impact of screen brightness of the digital devices on prevalence of computer vision syndrome and the most prominent symptom of CVS amongst the Optometry students, Also the purpose is to create awareness against harmful effect of digital device and tell how to protect and prevent our eyes from such digital devices.

Methodology

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?

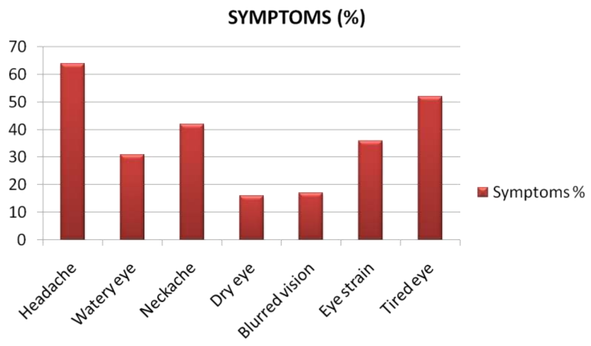
The data was analyzed with the help of SPSS version 21. The descriptive data was presented in percentage. The Chi-square test of significance was used for analysis of categorical value.

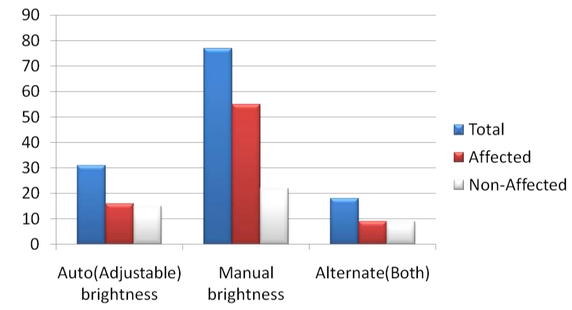
Results

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

Present Study	Ethiopia Study[6]	Nepal Study[7]
1. A prospective survey based study was conducted in the Saifai, Etawah during the March-May 2019.	1. A prospective study was conducted in the University of Gondar, Gondar Ethiopia during September 2018.	1. A prospective study was conducted in KIST Medical college and teaching hospital, Lalitpur, Nepal during June 2018.
2. Total 126 subjects reported for the checkup and out of which 64% people were suffering from CVS.	2. Total 607 participants out of which 69.5% suffering from CVS.	2. Total 100 medical students out of which 74% were complaining from CVS manifestation.
3.The most common symptoms were Headache(64%),watery eye(31%),eye strain(36%),neckache(42%),while dry eyes(16%),blurred vision(17%) and tired eye(52%) were the least commonly experienced symptoms.	3.The most common symptoms Headache(33%),watery eye(44%),eye strain(47%) while blurred vision (62%),dry eye(22%).	3. The most common symptoms Headache (68%), eye strain (89%), neckache (78%), while dry eye (71%).
4. It was found that who were use the visual device on the auto brightness mode less suffered (19.8%) from CVS than the manual brightness mode (69.1%) as well as both (alternate) mode (11.1%).	4. The aspects such as brightness mode of visual devices was not included.	4. The aspects such as brightness mode of visual devices was not included.
5 . Data analysis performed using SPSS version 21 & Chi-square t est Symptoms (Headache, Neck Pain, Tired Eyes) were statistically significant ($p<0.05$) , as a cause of CVS.	5. Analysis was performed using SPSS version 20 . Significance level was obtained at 95% CI and p value<0.05.	5. Data analysis was done using SPSS statistics version 25.

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.

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.

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