ISSN: 2091-2749 (Print)
2091-2757 (Online)

Computer vision syndrome: a rising problem during COVID-19 period amongst students and online workers

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Abstract

Dear Editor,

Computer vision syndrome (CVS) is defined as complex eye discomfort and vision problems associated with prolonged exposure to digital screens.[1] Symptom include headache, dry eyes, eye strain, blurring of vision, and ocular discomfort after prolonged exposure to light from computers.[2,3] Blue light filtering lenses can be used to minimize CVS.[2] Globally, around 70 million workers are at risk for computer vision syndrome which reduces the quality of life and works productivity.[1] In the western world, the use of computers, for both vocational and non-vocational activities, is almost mandatory.[1] In today's COVID-19 (Corona-Virus Disease - 2019) era, the use of computers and other digital screen devices is surging in Nepal as well, especially for online study and work from home to control the further spread of coronavirus. Moreover, the lockdown and shutdown did for the virus control by minimizing human gathering increase the demand for virtual learning and working through the online medium.[14]

Risk factors of computer vision syndrome can be classified into five categories: 1. Personal, 2. Environmental, 3. Computer-related, 4. Visual related, 5. Extraocular related.[4] Personal factors include reduced eye movement, poor posture, and poor distance while working on a computer without a break in between. Environmental factors are associated with poor lighting and its imbalance with computers and the surrounding environment. Computers-related issues include reducing refresh rate, poor screen resolution, poor contrast, and glare. Visually related risk includes a blurred vision and double vision. Extraocular risk factors include pain in the neck, back, and shoulder.[4]

The prevalence of computer vision syndrome is increasing in the world as well as in Nepal. In an online questionnaire-based study among higher secondary school children in India who were attending online classes during the COVID-19 pandemic, the mean duration of digital screen exposure increased from 1.9 ± 1.1h (before COVID) to 3.9 ± 1.9 h (after COVID).[15]

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Submitted
03 Aug 2021

Accepted
21 Aug 2021

How to cite this article
Bibek Raj Parajuli, Sanjib Koirala, Abhishek Bajracharya. Computer vision syndrome: a rising problem during COVID-19 period amongst students and online workers. Journal of Patan Academy of Health Sciences. 2021Aug;8(2):6-9.

https://doi.org/10.3126/jpahs.v8i2.30380

Further, different studies were done in different parts of the world and Nepal, Table 1. In the study done in Chennai among the medical and engineering students the high prevalence of CVS was reported around 81.9%. [13] Similarly in Malaysia, a prevalence of 89.9% was reported among university students.[6] A low prevalence of 59.9% was reported in Mauritius among keyboard users.[1] In the study done in Jeddah at King Saud Bin Abdulaziz University of Health Sciences, among 344 students, 78% of the participants were found to be using mobile phones. The number of symptoms was reported higher in female students who wear eyeglasses and who work on glare screens.[5]

In a study from five universities in Malaysia, 795 students, aged between 18 and 25 years found an 89.9% prevalence of CVS. The most common symptom was headache (19.7%) followed by eye strain (16.4%). Students using computers more than two hours a day experienced more symptoms of CVS. Students who looked at distant objects in between the work were associated with less frequency of CVS symptoms. The symptoms of CVS were not reduced by using filters on the screen.[6]

In the survey done at the Institute of Medicine, Nepal, among 236 students, most of the students (37.2%) spent 2-3 hours on the computer. About 69.5% of the students used computer screens at eye level and had less CVS compared to the students who use computer screens below eye level. A 22.9% of students knew about CVS, and only 25.5% of them maintained proper visual distancing while using a computer. Among 80 medical students whose eyes were examined, the prevalence of CVS was found to be 71.6%. The most common ocular symptoms were headache (50%) and dry eye (45%). Common refractive errors reported were myopia (31.2%) and orthoptic problem (17.5%).[7]

A study conducted among 105 employees in Nobel Medical College and Teaching Hospital, Biratnagar, Nepal, showed that about 80% of the employees spent about 8-11 h/d on computer work, and 92.4% had CVS. About 45% of the participants were using glasses for refractive errors. Similarly, dry eye was found in 60-70% of the participants.[8]

University students in Jordan showed that around 63.5% were using digital devices for more than 4 y and only 10.7% for <1 y. About 55.5% of participants were spending more than 6 h on digital devices, and only a few (1.3%) <1 h/d. Smartphones users were 52.9%, and only 2.1% were using desktops.[9]

A study done among 263 IT workers in Kathmandu, Nepal, showed the prevalence of CVS at 82.5% and 62.0% were not conscious of the effect of prolonged exposure to screen, while 53.2% used goggles as protective measures. The most common symptoms observed were headache (48.0%), tired eyes (47.0%), and eye strain (43.0%). The CVS was seen in workers who spent >4.75 h/d on the computer.[10]

Table 1. Prevalence of Computer Vision Syndrome (CVS) in studies from different parts of the world

Study/Place	Prevalence of CVS %
Chennai[13]	81.90
Malaysia[6]	89.90
Mauritius[1]	59.90
IOM, Nepal[7]	71.60
IT Workers Kathmandu, Nepal[10]	82.50
Nobel Medical College, Nepal[8]	92.40

Broadly, symptoms of CVS are classified into four main groups: 1. Asthenopia, 2. Ocular surface-related, 3. Visual, 4. Extraocular.[4,11] Asthenopic symptoms include difficulties in performing close-up work, headache, eye pain, redness, and eye strain. Ocular surface-related problems include eye pain, conjunctival injection, conjunctival swelling,

and swelling of the eyelids. Visual-related symptoms are blurred vision, delay in focus change, double vision, presbyopia, and reduced blink rate. Extra-ocular symptoms include pain in the neck, back, and shoulder.[4,11]

Diagnosis of CVS includes detailed history taking and complete ocular examination. Following the patient's history, clinical examination including binocular vision test, refraction test, and tear film assessment should be done.[4]

Optical correction of refractive error is the mainstay for treating CVS as it can decrease the stimulus to accommodation. Dietary supplement of Omega-3 fatty acid helps maintain tear stability. Computer workers can also wear blue light filtering glasses to reduce visual fatigue/discomfort. In the case of dry eyes, artificial tear supplements like Carboxymethyl cellulose (CMC) and Hydroxypropyl methylcellulose (HPMC) can be used.[4,12]

Preventive factors to avoid this condition should mainly focus on the working environment, i.e, ergonomic factors which affect the course of CVS. The proper sitting position in front of the computer display, proper lighting of the room, brightness and contrast of the screen, angle and distance of eye to the screen (mean distance of eye to the screen should be 60-80 cm for computer screen, 30 cm for cell phone), including height of computer screen at the level of the eye should be maintained to prevent from eye fatigue, dryness and eventually CVS.[4] Similarly, the rule of 20-20-20 is a common and simple method to avoid visual fatigue, i.e., looking at a distance of 20 f, 20 s, 20 m of computer usage.[4] Likewise, since increasing the blink rate may be impractical, a suggestion of achieving complete corneal coverage during blinking may help in reducing the discomforts due to CVS.[11]

In conclusion, computer vision syndrome mainly comprises headache, dry eyes, blurring of vision, diplopia, eye fatigue, and ocular discomfort. A detailed history and complete ocular examination are necessary to diagnose CVS. The prevalence is increasing especially during the COVID-19 period. CVS has been found mainly among students and online workers. Excessive use of smartphones is the major cause of CVS worldwide. Several preventive measures like maintaining proper distance from the screen, adequate lighting, wearing proper glasses, and taking regular breaks can be advantageous to reduce symptoms of CVS.

Acknowledgment

We would like to express our sincere thanks to Dr. Santosh Koirala, Ph.D., and Dr. Renu Poudel (Ophthalmologist, Gandaki Medical College, Nepal) for their support and guidance in the preparation of this article.

Conflict of Interest

None

Funding

None

Author Contribution

Concept, design, planning: BRP, SK, AB; Literature review: BRP, SK; Draft manuscript: BRP, SK, AB; Revision of draft: BRP, SK; Final manuscript: BRP, SK, AB; Accountability of the work: BRP, SK, AB.

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