

**Original Article****Study on Knowledge and Prevalence of Computer Vision Syndrome among Computer Operators in Nobel Medical College Teaching Hospital, Biratnagar, Nepal**Pramod Sharma Gautam<sup>\*</sup>, Uday Chandra Prakash, Subreena Dangol

Department of Ophthalmology, Nobel Medical College and Teaching Hospital, Biratnagar, Nepal

Article Received: 28<sup>th</sup> September, 2020; Accepted: 11<sup>th</sup> December, 2020; Published: 31<sup>st</sup> December, 2020DOI: <http://dx.doi.org/10.3126/jonmc.v9i2.33386>**Abstract****Background**

The eye and vision related problems that results from continuous use of computers and other visual display terminals for extended period of time leads to computer vision syndrome. Due to rapid digitalization in human life, the risk of developing it has also increased in many folds. So, with an aim of determining the prevalence and level of awareness of computer vision syndrome among computer users along with their attitude and practices to prevent it, this study was conducted in the office employees who use computer for a considerable period of time.

**Materials and Methods**

A hospital based observational descriptive study was conducted in the out-patient department of Ophthalmology in Nobel Medical College Teaching Hospital, Biratnagar, where 105 employees working in different work stations of same institution were enrolled. A questionnaire and the clinical findings were used to collect data.


**Results**

About 80% of the employees were using computer for about (8-11) hours per day. Prevalence of computer vision syndrome noted was (92.4%) with low level of knowledge (85.7%) about it. About 45% of them wore glasses for their refractive errors but attitude and practices in work place to prevent the bad effects of using visual display terminals were found to be lacking (53.3%). Burning sensation in the eye, headache, ocular irritation and itching and neck, shoulder or back pain were the common symptoms. Around (60-70)% of the eyes tested positive for dry eye.

**Conclusion**

Lack of awareness of computer vision syndrome and lack of personal protective measures were associated with its high level of prevalence.

**Keywords:** *Asthenopia, Backache, Dry eye, Refractive errors*

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## Introduction

Computer vision syndrome (CVS) is the eye and vision related problems that results from continuous use of computers and other visual display terminals (VDTs) for extended period of time [1]. The clinical features of CVS can be divided into 3 categories. One of the categories is vision related (asthenopic or accommodative) symptoms which includes eye ache, headache, diplopia, etc. Second category includes ocular surface related symptoms like red eye, dry eye, burning, irritation, and so on and third category is extra-ocular symptoms such as neck pain, shoulder pain, backache and other musculo-skeletal discomforts [2].

In this era of 21<sup>st</sup> century, computers, mobiles and other VDTs are increasingly becoming an integral part of human life whether it be at homes or at work places [3]. Even in developing countries like Nepal, a significant portion of working population is currently using VDTs at their job places. With the advent of VDTs, not only the quantity and quality of works and efficiency of workers have improved, but also the problems associated with their prolong use have been increasing day by day.

As incidence and severity of the CVS can be reduced by adopting proper preventive measures while using VDTs for which awareness is the key factor. So this study was conducted with an aim of assessing the knowledge in terms of awareness about CVS and its preventive measures among the computer operators along with finding out the prevalence and occurrence of different symptoms of CVS among them.

## Materials and Methods

This is a descriptive observational study that was conducted in the out-patient department (OPD) of Ophthalmology in Nobel Medical College and Teaching Hospital (NoMCTH), Biratnagar from 20<sup>th</sup> July 2020 to 10<sup>th</sup> August 2020 after acquiring permission from institutional review committee (IRC-NMCTH) on 17<sup>th</sup> July 2020. An informed written consent was obtained from each of the participants before their enrollment in study. Computer operators working in different work-stations like medical record department (MRD), laboratories, pharmacy, administration, academic section, finance etc. of NoMCTH, Biratnagar who uses computer for a considerable period of time at their work place were enrolled for this study. Those having uncorrected refractive error, other ocular diseases and eyelid and other adnexal abnormalities were excluded. In a study done by Basnet A et al in Nepal, prevalence of CVS was 74% [1]. Using  $n = z^2 pq/d^2$ , the calcula-

ted sample size would be 105 for estimating the expected proportion with 5% absolute precision and 95% confidence where finite population of 160 (computer operators in NoMCTH, Biratnagar) was taken. So a total of 105 subjects were evaluated. Three specific pre-designed questionnaires viz. "questionnaire for level of knowledge in CVS", "questionnaire for level of attitude and practices in work place to prevent CVS" and "questionnaire for symptoms of CVS" were put forward along with other details related to computer use to fill up the proforma. A routine ophthalmic examination of both eyes was conducted to rule out any other ocular comorbidity before patient's enrollment for the study. In addition, the tear film break up time (TBUT) and the Schirmer's test after topical anaesthesia with 4% xylocaine eye drop instilled three times at an interval of five minutes were also noted to evaluate the dry eye status. The data collected by questionnaire and observations made by examination were filled in pre-designed proforma and different variables were subjected to analysis in the form of mean, frequency, percentage and Chi-square test by using SPSS version 20.

## Results

The mean age of 105 subjects included in this study was 27.9 ( $\pm 6.6$ ) years. Among them 46 (43.8%) were male and 59 (56.2%) were female. More than 80% of them work on computer for at least 6-8 hours per day at their work place while almost same proportion also uses mobile-phone for a period of 2-3 hours every day at home. Table-1 shows the total duration of VDTs used by study participants per day combining the durations of use at their work place and at home and the period of computer usage in years. Around half of the participants (51.4%) were using computer for a period less than 5 years and rest were using it for more than 5 years.

**Table 1: Duration and period of VDTs usage**

Parameters	Frequency in No. (%)	
Duration in hours/day	<4	1 (1.0)
	4 to <8	17 (16.2)
	8 to <12	83 (79.0)
	12 to <16	4 (3.8)
Period in years	<1	8 (7.6)
	1-4	46 (43.8)
	5-8	27 (25.7)
	9-12	21 (20.0)
	>12	3 (2.9)

Regarding their level of knowledge about CVS, majority of the study subjects (85.7%) were unaware of symptoms of CVS. Among them, about 14.3% of the subjects never heard and did



not know anything about CVS while 71.4% of them only heard that prolonged use of computer affects the eye but they did not know about it in details. On the other hand, only minority of the study subjects (14.3%) knew about different symptoms of CVS either in isolation or in combination as shown in table 2.

More than half of the study subjects (53.3%) were not using any form of preventive measures at their work place to prevent CVS, however 47 (44.8%) of them wore glasses for their refractive errors. None of the participants were using contact lenses while about 16 (15.2%) of them occasionally used artificial tears. In addition to wholesome of one hour lunch break, only about 17.1% of the total participants took frequent breaks of around 5 minutes per hour during working period of 9:00 AM to 5:00 PM. Only small portion of the study subjects used other forms of preventive measures as shown in table 2.

**Table 2: Level of knowledge in CVS and undertaken preventive measures at work-place**

	Parameters	Frequency in No. (%)
Level of knowledge	Never heard	15 (14.3)
	Only heard but don't know in details	75 (71.4)
	Headache and eyestrain	14 (13.3)
	Visual symptoms like blurry vision, diplopia etc.	7 (6.7)
	Ocular surface symptoms like burning, irritation, tearing etc.	8 (7.6)
	Extra-ocular symptoms like neck pain, back pain etc.	5 (4.8)
	None	56 (53.3)
Preventive measures	Using glasses	47 (44.8)
	Frequent blinking	3 (2.9)
	Frequent breaks	18 (17.1)
	Using anti-glare screen	3 (2.9)
	Proper ergonomic design	3 (2.9)
	Regular eye check-up	5 (4.8)

**Table 3: Symptoms of CVS**

Symptoms of CVS	Frequency in No.(%)
Burning sensation	80(76.2)
Browache/Headache	77(73.3)
Irritation and Itching	64(61.0)
Neck/Shoulder/Back pain	55(52.4)
Feeling dryness in eye	50(47.6)
Heavy eyelids/Tired eyes	46(43.8)
Red eye	37(35.2)
Gritty/Foreign body sensation	30(28.6)
Blurring of vision	29(27.7)
Ocular pain	27(25.8)
Watering/Tearing	26(24.8)
Abnormality in near focusing	21(20.0)
Photophobia	21(20.0)
Diplopia	17(16.2)
Worsening of sight	16(15.2)
Increased blink reflex	11(10.5)
Coloured halos	8(7.6)

The frequencies of CVS symptoms occurring in the study participants are as shown in table 3. About 97 (92.4%) of the study population had at least one symptom experienced either "occasionally" (sporadic episodes or once a week) or "often/always" (2 or more times a week or almost every day) during computer use while 8 (7.6%) of them indicated "never" (doesn't occur at all) to all symptoms.

Burning sensation in the eyes and headache were the most frequently encountered CVS symptoms occurring in around 3/4<sup>th</sup> of study population followed by ocular irritation and itching, dryness and heavy eyelids/tired eyes in decreasing sequence. Significant number (52.4%) of study subjects also had neck, shoulder or back pain or combination of them. Red eyes, foreign body sensation, blurred vision, ocular pain and tearing were noted in more than 1/4<sup>th</sup> of the study population.

About 68.6% of right eye(RE) and 73.3% of left eye(LE) of all participants showed dry eye according to TBUT (which is 10 sec or less) while 62.9% of RE and 58.1% of LE showed the same when Schirmer's test with TA (which is less than 15mm) was considered. Table 4 shows the distribution of TBUT and Schirmer's test among the study participants. Both TBUT and Schirmer's test were found to be statistically highly significant with p-values of less than 0.001 for each.

**Table 4: Distribution of TBUT and Schirmer's test with topical anaesthesia**

Parameters	Frequency in No. (%)		
	Right eye	Left eye	
TBUT (seconds)	>10	33(31.4)	28(26.7)
	5-10	40(38.1)	62(59.0)
	<5	32(30.5)	15(14.3)
			P<.001
Schirmer's test (mm)	>15	39(37.1)	44(41.9)
	10-15	26(24.8)	31(29.5)
	5-10	27 (25.7)	18(17.1)
	<5	13(12.4)	12(11.4)
		P<.001	

Table 5 displays different parameters of VDTs used by the participants. Regarding the distance between eyes and computer screen, most of the participants (86.7%) maintained it between (50-100) cm. While about 77.1% of them kept the screen at the level of eyes. The brightness and contrast were set between (50-75)% in more than 3/4<sup>th</sup> of the computers used by study participants.





**Table 5: Different parameters of VDTs used by study participants**

Parameters	Frequency in no. (%)	
Distance between eyes and VDT screen (cm)	<50	9(8.6)
	50-100	91(86.7)
	>100	5(4.8)
Height of VDT screen from the eyes	At the same level	81(77.1)
	Above	10(9.5)
	Below	14(13.3)
Brightness of VDT screen (%)	<50	0(0.0)
	50-75	81(77.2)
	>75	24(22.8)
Contrast of VDT screen (%)	<50	0(0.0)
	50-75	82(78.1)
	>75	23(21.9)

## Discussion

CVS is the leading occupational hazard of the 21<sup>st</sup> century and it is also taken as one of the major public health problems. According to a data of 2007 AD, nearly an estimate of 60 million people in this world has already been experiencing CVS and a million of new cases occur each year [2]. Some of the authors around the world also call it an ocular epidemic of the 21<sup>st</sup> century and the burden of CVS is very high in many developing countries like ours because of factors like unawareness, lack of personal protective measures and prolonged and continuous work period with limited break time. In this study, the prevalence of CVS symptoms was found to be very high (92.4%) in which burning sensation in the eye was most commonly encountered symptom followed by headache. Irritation and itching in the eye, musculoskeletal (neck, shoulder or back) pain, feeling dryness in the eye and heavy eyelids or tired eyes were the common symptoms. Multiple studies conducted in different parts of the world have shown the prevalence of CVS as much as (70-90)% in all computer users. Similar to our study, a high prevalence of CVS was noted in a study conducted by Shrestha GS et al (92.1%) where tired eyes and headache were the commonest presenting symptoms [3]. Similarly, the prevalence of CVS in a study among university students was 89.9% [4] and another study conducted on bank employees was 85.2% [5] with headache and eyestrain being the commonest symptoms in both studies. A study conducted among engineering and medical students showed higher prevalence of CVS (81.9%) among engineering students as compared to 78.6% among medical students and concluded that it was due to prolonged use of computer among former group than later one [6]. A study conducted in Nigeria among computer users of Securities and Exchange Commission [7] and yet another study conducted among medical students in Nepal [1] had prevalence of

CVS of about 74%. Eyestrain, burning eyes, neck, shoulder or back pain, dryness, irritation and redness were the frequent symptoms occurring in more than 70% of cases among medical students [1].

In this study, around (60-70)% of the examined eyes tested positive for dry eye by TBUT and Schirmer's test with TA and more than 50% of those were having moderate to severe form of disease. Nearly similar findings were noted in study among medical students though majority of them were having mild to moderate form of dry eye [1]. In our study, only 14.3% of the study subjects were having good knowledge in terms of awareness of different CVS symptoms (either in isolation or in combination of various CVS symptoms) while 71.4% of them had poor knowledge (only they heard that prolonged use of computer affects the eye but they did not know the effect/s) and 14.3% of the participants were found to be totally unaware of the same (never heard that using computer for prolonged period affects the eye).

Although there were few studies on the level of awareness of CVS in different countries but available data on the same in various studies were found to be higher. The level of awareness of CVS was found to be 26.4% in students of faculty of medical sciences [8]. Similarly, even higher level of awareness (34.1%) was found among medical students where 23.54% of them had poor knowledge while 54% and 22.46% had average and good knowledge respectively [9]. In a study conducted in Nigeria, about 40% of the participants were aware of CVS, of which 27% had knowledge of the condition [7]. Yet in another study, about 87% of students of different medical undergraduate courses were aware of CVS [4]. A study conducted among Indian ophthalmologist, although all of them were aware of CVS, they were confused regarding the treatment modalities for CVS [10].

As because of low level of awareness of CVS among most of the participants in this study, there were very few subjects who took preventive measures against it but about 44.8% of them were wearing glasses for their refractive errors i.e. either myopia (37.2%) or astigmatism (7.6%). The most common risk factor that leads to such a high level of prevalence (92.4%) of CVS symptoms in this study was lack of awareness (85.7%). Prolonged and continuous work period on VDT (8-11 hours per day in more than 80%) with limited break time (around 5 minutes break per hour in only 17.1% apart from 1 hour lunch break to all) was also found. Other factors like lack of personal protective measures (53.3% of



those wearing glasses were excluded), presence of refractive errors (44.8%), lack of regular eye check-up (95.2%), improper ergonomic design (97.1%) etc. were thought to play some role in high prevalence of CVS in this study. Though the distance between VDT screen and eyes and the brightness and contrast were adequate and proper, the height of VDT screen at or above the level of eye (86.6%) could be the causes of high occurrence of musculoskeletal pain at neck, shoulder or low back (44.8%) and incomplete blinking in that position leading to high prevalence of dry eye (60-70%) even though around 45% of them wore glasses and 15.2% of them occasionally used artificial tears.

### Conclusion

The CVS among computer and other VDT users has been found occurring more commonly than expected. A high level of prevalence has been noted where most of the participants were indulged in works on computer and other VDTs for about (8-11) hours per day. Burning sensation in the eye, headache, irritation and itching in the eye, musculoskeletal (neck, shoulder or back) pain, feeling dryness in the eye, heavy eyelids or tired eyes and redness in the eye were the commonly encountered symptoms among them. A very low level of knowledge in terms of awareness about CVS symptoms among VDT users along with lack of preventive measures taken by them while using VDTs have been noted in most of the study participants.

### Recommendation

As digitalization in developing countries like Nepal is growing faster in many aspects of human life like in work place, educational system, social networking, and entertainment and so on, the rate of digital eye strain (CVS) also seems to be increasing proportionately which is by far a preventable condition. So in conclusion, we emphasize on the need of large, multicentre studies to find out the actual hidden part of an iceberg of CVS prevailed in our community so as to take appropriate steps in prevention of it to reduce the burden of disease.

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**Conflicts of interests:** None

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