



Ophthalmology

COMPUTER VISION SYNDROME- PREVALENCE, SYMPTOMS AND AWARENESS IN PATIENTS PRESENTING AT A TERTIARY CARE HOSPITAL IN BIHAR

Dr. Madhavi*	MBBS, MS, Senior resident, RIO, IGIMS, Patna, India. *Corresponding Author
Dr. Rajiv Kumar Singh	MBBS, Junior resident, RIO, IGIMS, Patna, India.
Dr. Gyan Bhaskar	MS, Professor, RIO, IGIMS, Patna, India.

ABSTRACT **Objective:** Computers have become indispensable tools in modern system of education and also at work place. Students are spending more time in-front of screen for online classes and some professions like engineers use screen for prolonged period of time. We have conducted this study to evaluate the prevalence, symptoms and awareness among patients regarding CVS at RIO, IGIMS, Patna. **Methods:** It is a cross sectional observational study conducted over 1 year in the outpatient department, RIO, Bihar. Patients more than 10 years old giving history of use of digital screen for more than 2 hours per day will be enrolled into the study. Patients who were found to be symptomatic were asked to fill the OSDI questionnaire. All symptomatic patients underwent Schirmer test and tear film stability test. Awareness regarding CVS in the patients was evaluated using a questionnaire. **Results:** The prevalence of CVS was 73% with 294 males and 206 females. The mean age of patients was 30.3 years. Most of the participants were between 21-30 years. The screen time for most participants (60%) was more than 6 hours per day. The chief complaint of majority patients was blurred vision and asthenopia whereas the secondary complaint was watering and headache. Maximum patients (38.20%) from our study were students, competitive exam aspirants, teachers and software engineers. 34% of patients were using mobile phones. The mean SEBR (spontaneous eye blink rate) was 13.50 minutes. The mean OSDI (ocular surface disease index) was 17.4. The screen time significantly correlated to SEBR ($p < 0.0001$). Also the screen time and OSDI correlation came out to be significant ($p < 0.001$). **Conclusion:** The present study revealed high prevalence of CVS among young patients. The ocular symptoms were predominantly affecting the convergence power of eyes and tear film instability causing blurred vision and dryness.

KEYWORDS : Computer vision syndrome, Prevalence of CVS, Awareness of CVS.

INTRODUCTION

Computer vision syndrome, defined by the American Optometric Association as a complex of eye and vision problem related to activities which stress the near vision and which are experienced in relation to or during the prolonged use of digital screens¹.

Computers have become indispensable tools in modern system of education & also at work place. Students are spending more time in-front of screen for online classes and some professions like engineers use screen for prolonged period of time. This has led to group of health disorders with ocular and extra ocular symptoms directly related to computer use. Prevalence of computer vision syndrome has not been studied in this north eastern part of India. Computer vision syndrome is under diagnosed disease since there is no standard criteria or any defining cut off limits available to classify this syndrome as CVS². We have conducted this study to evaluate the prevalence, symptoms and awareness among patients regarding CVS at RIO, IGIMS, Patna.

MATERIALS AND METHODS:

It is a cross-sectional observational study conducted over 1 year from August 2023 to August 2024 in the outpatient department, RIO, IGIMS, Patna, Bihar. Based on the previous studies conducted the prevalence of CVS was 75%, therefore by using relative margin error of 10% and fixing alpha error to be 0.05 and adding 10% non-responders, the total sample size was calculated to be 673 patients. Simple random sampling was done to achieve the sample size. Inclusion criteria- Patients more than 10 years of age, giving consent, using digital screens >2 hours/day. Exclusion criteria- less than 10 years of age, Patients with uncorrected refractive error, keratoconus, amblyopia, corneal scarring, facial palsy, lid disorders, meibomian gland disorders, active keratitis and conjunctivitis. History of use of any topical or systemic medications, previous history of ocular trauma, chemical injury, previously diagnosed dry eye. All patient included in the study, signed an informed consent and underwent a comprehensive history taking with emphasis on history pertaining to the computer vision syndrome e.g. history of usage of contact lens, visual display terminals including television, smartphone, laptops, desktop. Their average screen time hours per day. The mode of visual display terminal used like smartphone, tablet, laptop, desktop, television. Patients who used screens >2 hours per day and were symptomatic were then asked to fill the OSDI Questionnaire. Based on the CVS survey form and OSDI score, we shortlisted a total of 500 patients who were diagnosed with CVS and then these patient's symptoms were categorized and the patients suspected for dry eye were further undertaken for tear film stability tests (TBUT test) and Schirmer's tests.

RESULTS:

In the present study group of 673 patients, we diagnosed a total of 500 patients to be suffering from CVS with 294 (58.80%) were males and 206 (41.20%) females (Figure 1).

The mean age of the patients in the study group was 30.29 ± 08.88 years. 202 patients were in the age group of 20-30 years (40.40%) followed by 183 patients in age group 30-40 years (36.60%) (Figure 2).



Figure 1: Showing Gender distribution in our study group.

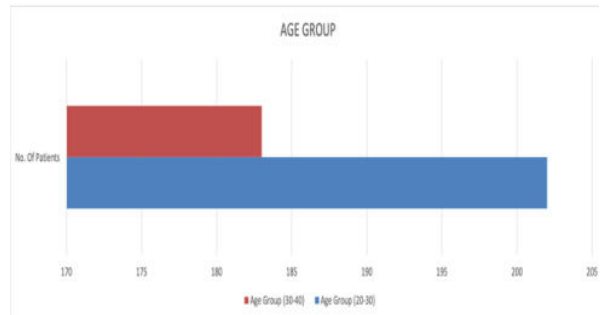


Figure 2: Age distribution among our study group.

Total of 171 patients were students/aspirants (38.20%) followed by 65 teachers (13.00%), 61 software engineers (12.20%) and 52 bankers (10.40), rest is other profession (Figure 3). 171 patients (34.20%) reported use of mobile phones followed by 136 patients with laptop (27.20%) and 116 patients with desktop computers (23.20%). 299 patients (59.80%) spend ≥ 06 hours in front of screen, followed by 197 patients (39.40%) who spend 03-06 hours. Only 04 patients (00.80%) used screen time for 01-03 hours. 87 patients (17.40%) had blurred vision as main complaint, followed by 55 patients (11.00%), 47 patients (09.40%) with asthenopia and grittiness as chief complaints.

Watering and eye strain was reported by 42 patients (08.40%). Headache, redness, itching, dryness and double vision was claimed by 41 (08.20%), 39 (07.80%), 36 (07.20%), 28 (05.60%), 26 (05.20%) patients respectively. Eye ache and foreign body was reported by 21 (04.20%) patients each. 15 (03.00%) patients reported burning as chief complain (Figure 4).

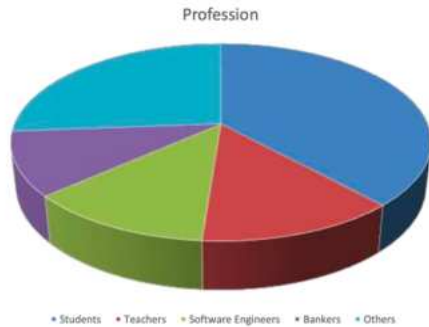


Figure 3: Prevalence of various profession who suffered from CVS.

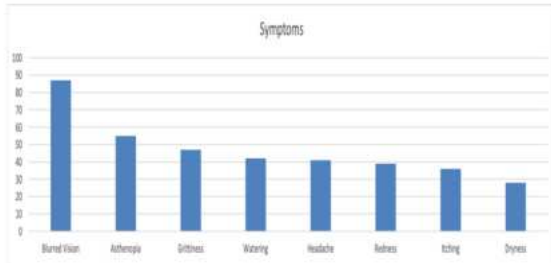


Figure 4: Prevalence of various symptoms in our study group.

Mean Schirmer's test I value for right eye was 21.29 ± 7.92 mm. Maximum 391 patients (78.20%) had range of ≥ 15 mm followed by 55 (11.00%), 39 (07.80%) and 15 (03.00%) with range of 10-15, 05-10 and 0-05 mm respectively. Mean Schirmer's test I value for left eye was 21.76 ± 11.35 mm. 393 patients (78.60%) had range of ≥ 15 mm, followed by 54 (10.80%), 42 (08.40%) and 11 (02.20%) with range of 10-15, 05-10 and 0-05 mm respectively (Figure 5).

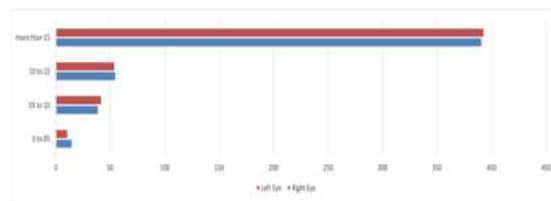


Figure 5: Mean Schirmer test I values for both right and left eyes.

Tear breakup time for right eye was 20.94 ± 7.33 seconds. 462 patients (92.40%) had range of ≥ 10 seconds. Only 38 (07.60%) had range < 10 seconds. 461 patients (92.20%) had range of ≥ 10 seconds. Only 38 (07.80%) had range < 10 seconds. Mean spontaneous eye blink rate was 13.50 ± 2.86 minutes. 240 patients (48.00%) had range of 12-15 seconds followed by 135 (27.00%) patients in the range in < 12 . Mean ocular surface disease index score was 17.44 ± 3.79 (mode 13). 447 patients (89.40%) had range of 13-22. Screen time was significantly correlated to the spontaneous eye blink rate (SEBR) ($r = -0.416$, $p < 0.0001$). Screen time was significantly correlated to the ocular surface disease index ($r = 0.245$, $p < 0.0001$). Awareness of CVS was 16%.

DISCUSSION:

From our study conducted on a total of 673 patients, we found that the prevalence of computer vision syndrome among the patient to be 73%. Similar results were obtained by Talwar et al, Iwakiri et al who reported 76% and 72% prevalence in their study group^{3,4}. A study performed by Sanjeev et al who observed prevalence of CVS among computer operators to be 74%⁵. In our study male patients were comparatively greater (58.8%) than female patient (41.2%), showing male preponderance. This result is similar to the study done by Anjila et al in which male patients turned out to be 64% and female, 36%³. About 40.4% of our patients having CVS where in age range of 21-30

years. Similar results were found by Talwar et al in their study 58.5% of individuals where in the 21-30 years. The patients who were mostly affected by CVS were college students, exam aspirants (38.20%) followed by software engineers (12.2%), bankers and people working as technicians.

The patients who were mostly affected by CVS were college students, exam aspirants (38.20%) followed by software engineers (12.2%), bankers and people working as technicians.

Screen time correlation with computer vision syndrome was found to be significant and most of the patients 59.8% used digital screen for more than 6 hours.

Similar results were observed in studies conducted by Shrivastava and Bobhate that ocular symptoms experienced by the patients increased with working hours on computer screens⁴.

In our study, most common ocular complaint was blurred vision 17.4% and watering 24.4%. In study conducted by Talwar et al, the prevalence of blurred vision was 13.2%. On the basis of OSDI, 89.4% had mild dry eye and 10.6% patient had moderate dry eye. Similar results were obtained by Rosenfield et al⁵. They reported 21% mild, 12% moderate and 18% severe, according to SDI data. TBUT and Schirmer's test where insignificantly correlated with screen time while the spontaneous eye blink rate (SEBR) should show positive correlation with screen time with p value < 0.001 . Our study has limitations since it was a cross-sectional study therefore this limits the study to deduce causality and risk factors associated with computer vision syndrome.

CONCLUSIONS:

Computer vision syndrome is a highly prevalent and highly under diagnosed disease. Due to high cognitive demand and continuous gazing the eye blink rate gets affected causing dry eye and grittiness like symptoms. Awareness of CVS is very low. These results denote a need for improved awareness about CVS so that better methods of diagnosis and precautionary management can be followed to prevent or delay the onset of this disease.

REFERENCES:

- Garber A, Klein E, Bruce S, Sankoh S, Mohideen P. Metformin-glibenclamide versus metformin plus rosiglitazone in patients with type 2 diabetes inadequately controlled on metformin monotherapy. *Diabetes, Obes Metab*. 2006;8(2): 156-63.
- Aparijtha Choudhary, Arpita Rai, S P Singh, Vibha Singh. Prevalence of computer vision syndrome and associated ocular morbidity in a tertiary care hospital. *International Journal of Research in Medical Sciences*. 2023;11(5):1611-1616.
- Talwar R, Kapoor R, Puri K, Bansal K, Singh S. A study of visual and musculoskeletal health disorders among computer professionals in NCR Delhi. *Indian J Community Med*. 2009;34:326.
- Iwakiri K, Mori J, Sotoyama M, Horiguchi K, Ochiai T, Jonai H, et al. Survey on visual and musculoskeletal symptoms in VDT workers. *Sangyo Eiseigaku Zasshi*. 2004;46:201-12.
- Verma S, Midya U, Gupta S, Shukla Y. A cross- sectional study of the prevalence of computer vision syndrome and dry eye in computer operators. *TNOA J Ophthal Sci Res*. 2021;59(2): 160.
- Basnet A, Basnet P, Karki P, Shrestha S. Computer vision syndrome prevalence and associated factors among the medical student in Kist Medical College. *Nepal Med J*. 2018;1(1):29-31.
- Shrivastava SR, Bobhate PS. Computer related health problems among software professionals in Mumbai: A cross-sectional study. *Int J Health Sci*. 2012;1:74-8.
- Rosenfield M, Jahan S, Nunez K, Chan K. Cognitive demand, digital screens and blink rate. *Computers Hum Behav*. 2015;51:403-6.