Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(4), 1226-1232 | ISSN:2251-6727

Prevalence, Risk Factor and Symptoms of Computer Vision Syndrome among Medical Students - A Tertiary Hospital Study.

Mohammed Athar Danish [1] ,Dr K Kalaivani [2]

[1]MS Post Graduate in Ophthalmology

[2]MBBS DO DNB MNAMS Ph.D (Ophthal), Professor and Head of Ophthalmology Department, Vinayaka Mission's Medical College, Karaikal, VMRF.

(Received: 14 April 2024 Revised: 1 May 2024 Accepted: 18 June 2024)

KEYWORDS
Digital Eye Strain, Vision Syndrome

ABSTRACT:

In today's educational environment, medical students in India heavily depend on digital technology for their studies, research, and communication. This shift, accelerated by the COVID-19 pandemic, has significantly changed how medical education is delivered and consumed [1]. While these advancements bring many benefits, they also pose new challenges, especially the increase in Computer Vision Syndrome (CVS) among medical students. CVS, also called Digital Eye Strain, includes various eye and vision problems caused by prolonged use of computers, tablets, smartphones, and other digital devices

Introduction: In today's educational environment, medical students in India heavily depend on digital technology for their studies, research, and communication. This shift, accelerated by the COVID-19 pandemic, has significantly changed how medical education is delivered and consumed [1]. While these advancements bring many benefits, they also pose new challenges, especially the increase in Computer Vision Syndrome (CVS) among medical students. CVS, also called Digital Eye Strain, includes various eye and vision problems caused by prolonged use of computers, tablets, smartphones, and other digital devices [2]

Medical students are at a higher risk of developing CVS due to their demanding academic schedules and extensive use of digital devices for studying, researching, and attending virtual classes [3]. Symptoms of CVS include eye strain, dryness, irritation, blurred vision, and headaches, often associated with neck and shoulder pain[4]. These symptoms can greatly impact their academic performance, clinical skills, and overall well-being [5].

Several factors contribute to the high occurrence of CVS among medical students in India. These include longer screen time, poor ergonomic practices, inadequate lighting, screen glare, and uncorrected vision issues [6]. The intense academic pressure and long study hours further strain their eyes [7]. Despite the common occurrence of CVS, awareness and preventive measures among medical students are still limited [8].

Thus, we conducted a study in order to provide a detailed look at Computer Vision Syndrome among medical students in a coastal district of Puducherry, explore its causes, symptoms, risk factors, and possible solutions. By highlighting the specific challenges faced by this group on digital screen usage for long hours, this study also seeks to increase awareness and promote effective strategies for preventing and managing CVS, ultimately improving the eye health and academic performance of future healthcare professionals.

Objectives: This study is done to determine the prevalence of computer vision syndrome among medical students and to observe the severity and associated risk factors among participants.

Methods: This was a single centre cross sectional observational study done in our tertiary hospital. It was approved by institutional ethical board. Informed consent was obtained. Data were collected using a purposely constructed E-questionnaire based on standard questionnaire by segue et al [9] on google forms. It consists of total 22 questions including demographics, time spent on digital screen, their refractive status, symptoms of digital screen usage. Medical students who

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 1226-1232 | ISSN:2251-6727

were between 18-40 years and gave their consent were included in this study. We excluded the patients of age less than 18 years, who had not given their consent, patients with keratoconus, corneal scarring, facial palsy, lid disorders, meibomian gland disorders, active keratitis and conjunctivitis, patients with history of previous use of any topical medications other than tear supplements, patients using any systemic medications like diuretics, beta blockers, oral contraceptive pills, antidepressants, antihistamines. We also excluded patients with previous history of ocular trauma, chemical injuries, refractive surgery, proven cases of dry eye, Steven Johnson syndrome, ocular cicatricial pemphigoid, trachoma and Riley-Dey syndrome.

The e questionnaire was distributed using online link among medical students and they were asked to complete the questionnaire. After data collection, Categorical variables were expressed as number and percentage and compared across the groups using Pearson's Chi Square test and Fisher's Exact Test. Continuous variables were expressed as Minimum, Maximum, Mean, Median and Standard Deviation and represented using Histograms. The statistical software SPSS version 25 had been used for the analysis. An alpha level of 5% had been taken, i.e. p value less than 0.05 had been considered as significant.

Results:

In our study, we had total of 338 students as participants. The mean age of participants was 22.32 years (figure1). Among them 61.3% responders were females and 39.7% were males.

Based on the hours spent on digital screen in 24 hours period, 10 (3.0%) participants reported usage of <1 hour/day, 139 (41.4%) as 1-4 hours, 159 (47.3%) as 4-8 hours and 28 (8.3%) participants as 8-16 hours per day.

Among the study population, 200 (59.5%) participants used the screen 1-3 hours during day time, 92 (27.4%) participants had 3-5 hours ,33 (9.8%) participants had 5-7 hours and 11 (3.3%) participants had 7-12 hours of screen time during the day.

Regarding night time usage, 226(67.3%) participants reported 1-3 hours, 84(25.0%) reported 3-5 hours and 26(7.7%) participants reported 5-7 hours of screen time.

Regarding the total duration of usage, 41(12.2%) participants reported <1 year, 145(43.2%) reported 2-3 years, 77(22.9%) reported 3-4 years and 73(21.7%) participants reported >5 years.

Totally 5(1.5%) participants were using desktop computer, 15(4.5%) were using laptop, 21(6.3%) were using I pad/tab and 295(87.8%) participants were using android/apple smart phone.

Considering the background illumination, 175(52.1%) reported 10-30%, 122(36.3%) reported 30-60%, 33(9.8%) reported 60-80% and 6(1.8%) reported 80-100% illumination of their screen.

Considering the symptoms among the participants, 166(49.4%) were asymptomatic, 80(23.8%) had onset of irritation and tiredness in <1 hour, 90(26.8%) had onset after >3 hours of screen time.

Total of 164(48.8%) had refractive error among participants and 45(13.4%) had progression in their power and 11(3.3%) had regressed and 89(26.5%) had stable refractive error.

Among the study population, 12(3.6%) participants were using contact lens and 154(45.8%) were using spectacles. Among the spectacle users, 70(20.8%) were using tinted glasses and 16.4% of them had reported that tinted glasses gave them better relief of symptoms.

Regarding the impact of electronic gadgets usage on their life style and eye health, 255(75.9%) reported a positive impact and 81(24.1%) had negative impact. Majority of the participant, 306(91.1%)s were willing to decrease screen time to guard against CVS.

Among the chronic users who were exposed to the screen continuously for more than a year, maximum of 41(12.2%) people reported symptoms of blurred vision and eye strain, 4(1.2%) reported double vision on post screen usage, 28(8.3%) reported redness and irritation, 35(10.4%) reported fatigue and difficulty in refocusing the eyes and 228(67.9%) had no symptoms (table 1/figure 3).

Among the study population, after 1 hour of screen exposure time, 57(71.25%) had symptoms and after 3 hours, 31(34.44%) developed symptoms which showed a significant result with p value <0.001 (fig 3)

Among the symptomatic people, 7(58.33%) were hypermetropic, 48 (36.09%) had myopia and

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 1226-1232 | ISSN:2251-6727

45(26.16%) had astigmatism with p value 0.038 which is also significant (table 2).

In the study population, 20(44.44%) had had increase in their refractive power and 38(42.70%) had stable refractive power with the significant p value of 0.001 (fig 5). In this study, 30(73.17%) had blurred details of the objects after prolong usage (>6 hours/day), 11(45.83%) had difficulty in vision and 67(24.72%) had clear vision after prolong usage with p value <0.001 which was significant (fig2).

Among the participants who had symptoms of CVS, 4(33.33%) were wearing contact lens and 60(38.96%) wearing spectacle (p value=0.042) (fig 7). Among the spectacle wearers, 28 (40.00%) were using tinted glasses and majority of them reported to have relief of symptoms with significant p value of 0.031.

Among the study population with computer vision syndrome, 96(37.65%) felt that digital screen affects their life style and eye health and 12(14.81%) had no effect (p value <0.001) (fig 8).

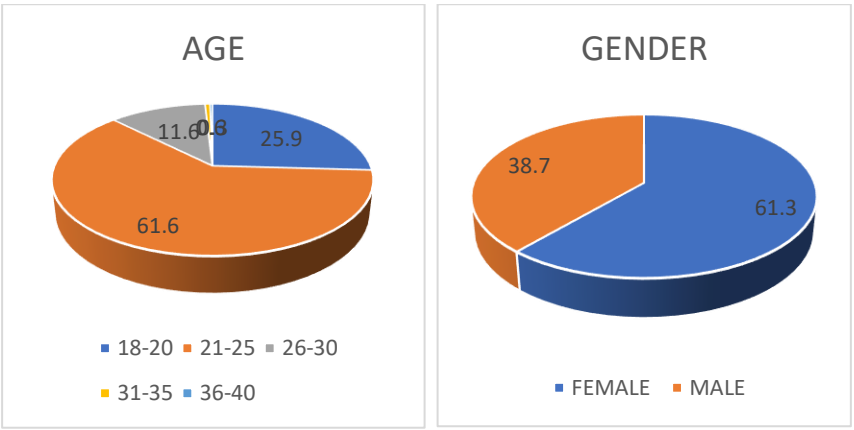

Figure 1: Age and Gender Distribution

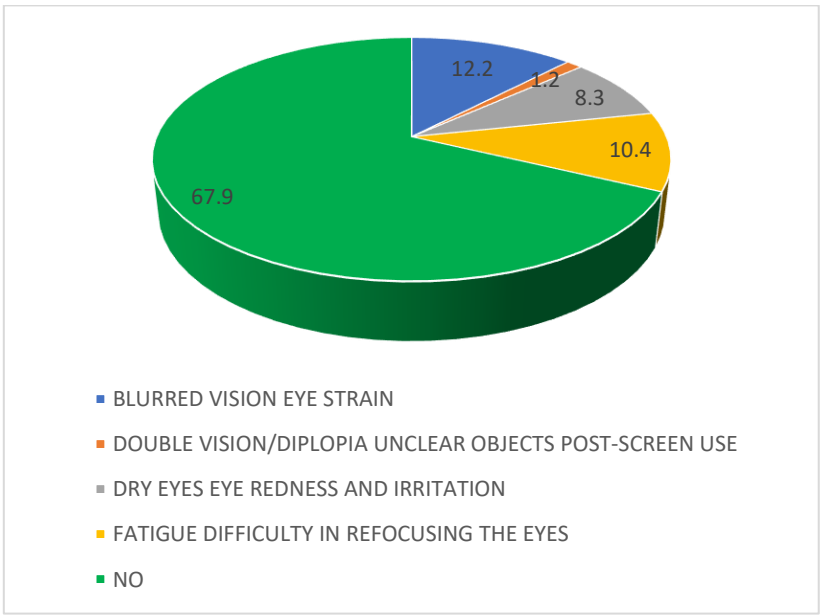

Fig 2 Showing Symptom Frequency

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 1226-1232 | ISSN:2251-6727

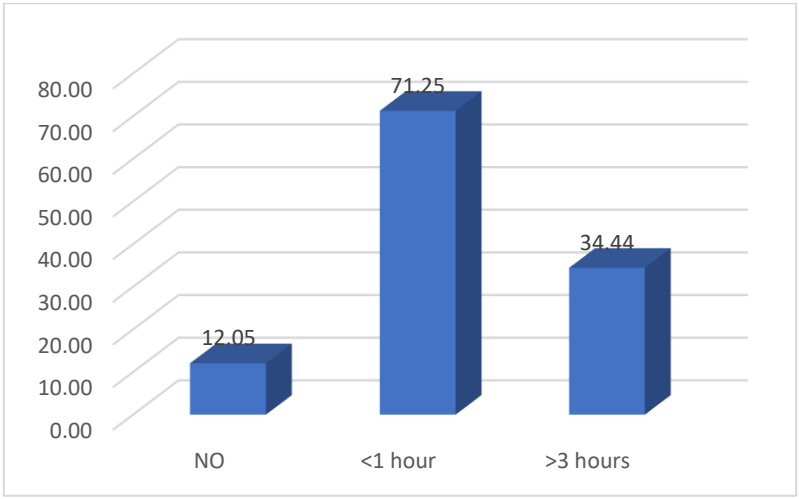

Fig 3: Showing Time of Onset of Symptoms in Participants with CVS

Type of Refractive Error	Number	Percent
HYPERMETROPIA	7	58.33
MYOPIA	48	36.09
MYOPIC/HYPERMETROPIC ASTIGMATISM	8	42.11
NO	45	26.16
p Value	0.038	
Significance	Significant	

Table 1: Distribution of Refractive Error in Patients with CVS

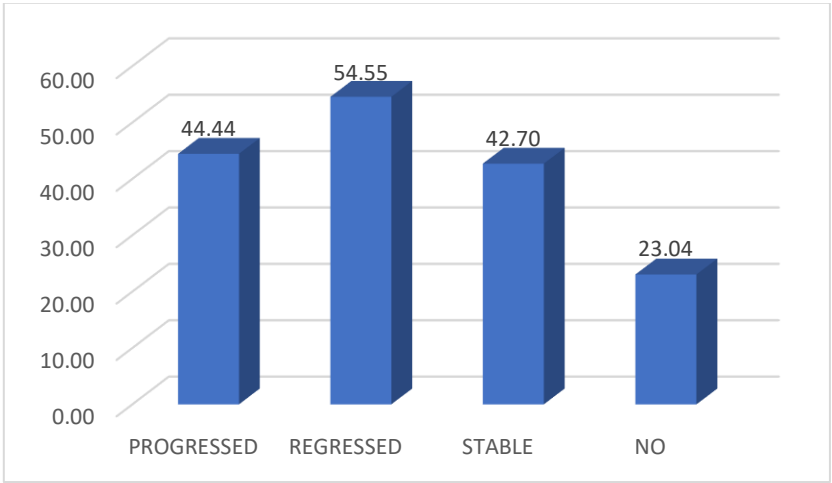

Fig 5: showing Progression of Refractive Status

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 1226-1232 | ISSN:2251-6727

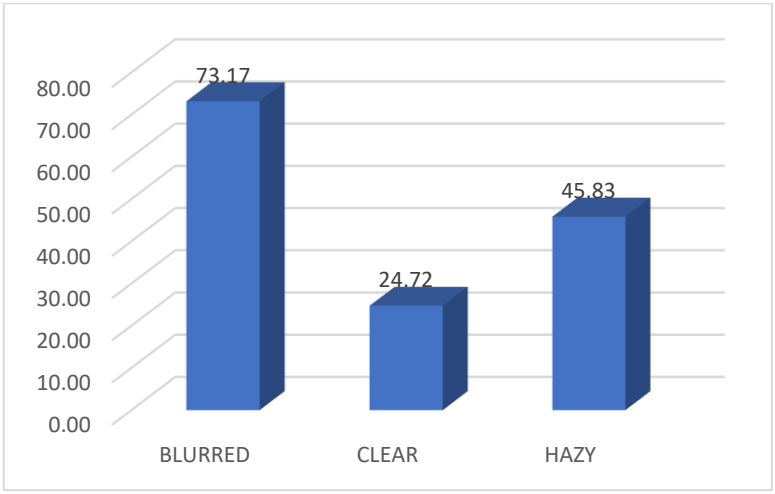

Fig 6: Clarity of vision after Prolonged Usage of Digital Screen

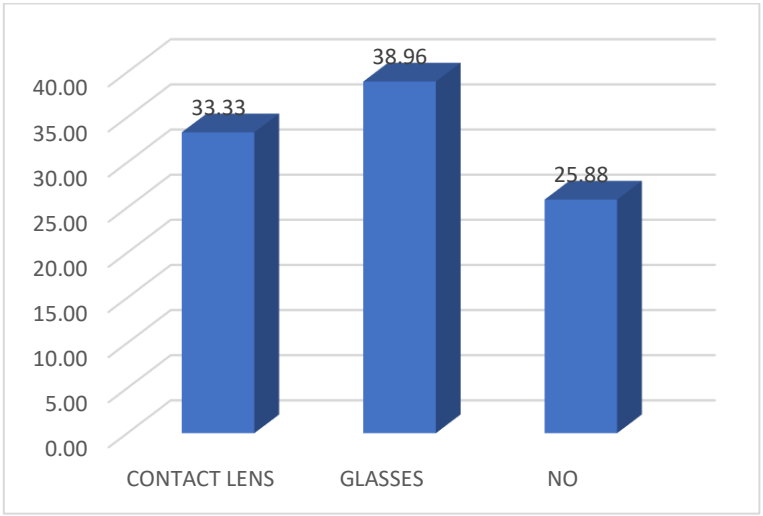

Fig 7: Contact lens/ Spectacle usage in patients with CVS

Symptom relief with tinted glasses	Number	Percent
NO	13	30.23
YES	26	47.27
Not using tinted glasses	69	28.99
p Value	0.031	
Significance	Significant	

Table 2: Relief of Symptoms with Tinted Glasses

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 1226-1232 | ISSN:2251-6727

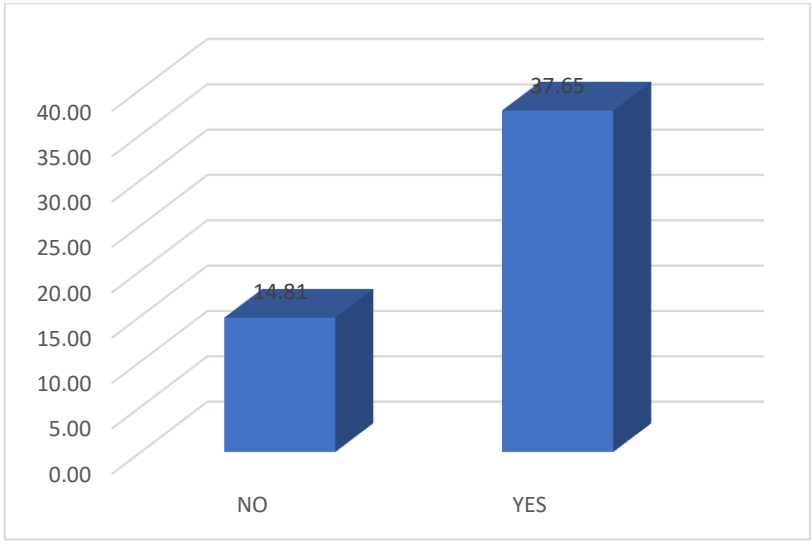

Fig 8: Impact of Digital Screen on Life Style and Eye Health

Discussion: Among the total 336 participants, 206(61.3%) were female and 130(38.7%) were male. The prevalence of computer vision syndrome in this study was 32.1%. A study by Mohan et al[10] in 2017 found that 50.23% of schoolchildren in South India reported symptoms of CVS .

In this study, 57(71.25%) developed symptoms after 1 hour of screen time and 31(34.44%) after 3 hours with significant p value of <0.001. Similarly study done by Sheedy et al [11] in 2003 also showed that symptoms such as eye strain, headaches, and blurred vision appeared after one hour of screen use.

Patients with refractive error experienced more severe symptoms of CVS in our study. Similar results had been found in the study conducted by Porcar et al [12] They also reported that participants with uncorrected or inadequately corrected refractive errors had higher levels of visual discomfort, eye strain, and blurred vision and stress the need to correct the refractive error to minimize symptoms of CVS.

Among the patients with refractive error, 20(44.44%) had progression of refractive power, 38(42.70%) had stable refractive power (p-value 0.001). Similar results were found in a study done by Rosenfield er al [13] in 2011 who depicted progression of refractive error after prolonged near work.

Among spectacle users with CVS, 28(40.00%) had history of using tinted glasses and among them 26(47.27%) reported better relief of symptoms (p- value 0.031). Similarly, a study conducted by Berman et al [14] in 2006 found that wearing blue light filter glasses provide significant reduction in eye strain and discomfort.

Limitation: Since our study was conducted in a hospital setting, the findings may not accurately reflect the true prevalence of CVS in the general community.

Conclusion: The overall prevalence of CVS in our study was 32.1%. Prolonged digital screen use showed a significant contribution in the development and exacerbation of Computer Vision Syndrome. Symptoms such as eye strain, headaches, blurred vision, and dry eyes typically begin to appear after one hour of continuous screen use. Individuals with uncorrected refractive errors were particularly susceptible to severe symptoms and progression of refractive error in our study. This suggests that reduction in screen time, proper lighting, wearing appropriate spectacle and regular follow ups can effectively reduce the symptoms of Computer Vision Syndrome.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be

published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest

References:

1. Gupta, N., & Jindal, S. (2021). The Digital Transformation of Medical Education in India. Medical Education Journal, 55(4), 350-359.
2. American Optometric Association. (2020). Computer Vision Syndrome. Retrieved from https://www.aoa.org
3. Babu, R. (2021). Impact of Digital Screen Usage on Eye Health Among Medical Students. Journal of Ophthalmology, 128(3), 204-210.
4. Sheppard, A. L., & Wolffsohn, J. S. (2018). Digital Eye Strain: Prevalence, Measurement and Amelioration. BMJ Open Ophthalmology, 3(1), e000146
5. Kaur, R., Sharma, A., & Singh, P. (2022). Prevalence and Risk Factors of Computer Vision Syndrome Among Medical Students. Indian Journal of Ophthalmology, 70(1), 56-61.
6. Reddy, S. C., Low, C. K., Lim, Y. P., Low, L. L., Low, W. C., & Nursaleha, M. P. (2013). Computer Vision Syndrome: A Study of Knowledge and Practices in University Students. Nepal Journal of Ophthalmology, 5(2), 161-168.
7. Saxena, R., & Saxena, S. (2020). Ergonomic Practices to Reduce Digital Eye Strain. Journal of Clinical and Diagnostic Research, 14(6), NC01-NC05.
8. Shantakumari, N., Eldeeb, R., Sreedharan, J., & Gopal, K. (2014). Computer Use and Vision-related Problems Among University Students in Ajman, United Arab Emirates. Annals of Medical and Health Sciences Research, 4(2), 258-263.
9. Seguí Mdel M, Cabrero-García J, Crespo A, Verdú J, Ronda E. A reliable and valid questionnaire was developed to measure computer vision syndrome at the workplace. J Clin Epidemiol. 2015 Jun;68(6):662-73. doi: 10.1016/j.jclinepi.2015.01.015. Epub 2015 Jan 28. PMID: 25744132.
10. Mohan, A., Sen, P., Shah, C., Dattatreyamurthy, B., Jain, E., & Jain, S. (2017). Prevalence and risk factor assessment of digital eye strain among children using online e-learning during the COVID-19 pandemic: A cross-sectional study. Indian Journal of Ophthalmology, 69(1), 140.
11. Sheedy, J. E., Hayes, J. R., & Engle, J. (2003). Is all asthenopia th e same? Optometry and Vision Science, 80(11), 732-739
12. Porcar, E., Pons, A. M., & Lorente, A. (2016). Visual and ocular effects from the use of flat-panel displays. International Journal of Ophthalmology, 9(6), 881-885
13. Rosenfield, M. (2011). Computer vision syndrome: A review of ocular causes and potential treatments. Ophthalmic and Physiological Optics, 31(5), 502-515