RESEARCH PAPER

"PREVALENCE OF COMPUTER VISION SYNDROME AND ITS ASSOCIATION WITH ERGONOMIC AND BEHAVIOURAL FACTORS AMONG SECOND-YEAR MBBS STUDENTS."

Dr. Pramod Prabhakar Bhalerao[1*], Dr. Chaitra Vikram Rajadnya[2], Dr. Vikram Anant Rajadnya[1]

[1]Department of Pharmacology, D. Y. Patil Medical College, Kolhapur, Maharashtra, India
[2]Department of Psychology, The New College, Kolhapur, Maharashtra, India
Corresponding author: Dr. Pramod Prabhakar Bhalerao | Email: bhaleraopramod15@gmail.com

ABSTRACT

A group of eye and vision issues brought on by prolonged use of digital gadgets is known as Computer Vision Syndrome (CVS) or Digital Eye Strain. Excessive use of smartphones, laptops and tablets puts medical students at risk. This study's goal was to determine the prevalence of CVS and how it related to behavioural and ergonomic factors in second-year MBBS students at Dr. D. Y. Patil Medical College in Kolhapur. After ethical clearance and consent, 125 students by convenience sampling participated in this cross-sectional study by completing a structured google forms questionnaire. Demographic, device usage, ergonomic practices, awareness of preventive measures, and answers to the validated Computer Vision Syndrome Questionnaire (CVSQ) were collected. A CVSQ score of ≥6 was considered as CVS. Independent samples t test, the statistical analysis employed Spearman's rank correlation and the Mann-Whitney U test. Participants' mean age was 20.07 ± 1.23 years; 71 (56.8%) were female and 54 (43.2%) males. CVS prevalence was 36.0%, with a mean CVSQ score of 5.03 ± 4.64. The most frequent symptoms were tearing (51.2%), headache (46.4%), itching (41.6%), foreign body sensation (40.8%), and eye pain (36.0%). There were no significant gender differences ($p = 0.869$). With regular use of the 20 20 20 rule, students had significantly lower CVSQ scores ($p < 0.05$). There was no correlation between total screen time and CVS severity ($p = 0.296$). Prescription Glasses users had higher CVSQ scores compared to non-users ($p = 0.0373$). One third of these medical students develop CVS and there are ergonomic and behavioural factors that can be modified that are associated with CVS. Following the 20 20 20 rule and other preventative measures such as awareness of digital ergonomics can help to minimize symptoms and improve eye health.

Key words- Computer Vision Syndrome; Digital Eye Strain; Ergonomics; Medical Students; 20 20 20 Rule; Refractive Errors.

How to cite this article: Bhalerao PP, Rajadnya CV, Rajadnya VA. Prevalence of Computer Vision Syndrome and Its Association with Ergonomic and Behavioural Factors Among Second-Year MBBS Students. Int J Drug Deliv Technol. 2026;16(54s): 1121-1128. DOI: 10.25258/ijddt.16.54s.96

Source of support: Nil.

Conflict of interest: None.

Introduction

1.1 Background A collection of ocular and visual symptoms that arise from extended use of digital devices such as computers, tablets, and smartphones is called digital eye strain (DES), often referred to as digital display fatigue. The American Optometric Association (AOA) states that continuous screen use of up to two hours can cause DES [1]. In recent years, digital technology has been increasingly adopted for recreational and educational uses in all age groups [2]. Digital gadgets provide learning possibilities, entertainment, and social connections, but prolonged use of them can result in a set of eye symptoms known as CVS, or digital eye strain [3]. Commonly reported symptoms include blurred vision, eye strain, headache, ocular dryness, redness, and pain in the neck and shoulder region [4]. Driven by rapid technological progress, digital devices have become deeply embedded in everyday life, serving as fundamental instruments for students across academic, literary, and recreational domains [5].

1.2 Rationale and Objectives CVS can be attributed to various causes, such as poor lighting, insufficient contrast on the screen, inadequate illumination of the workplace, prolonged screen usage without breaks, refractive errors and inappropriate viewing distance [6,7]. The "20 20 20 rule" and taking a 20-second break every 20 minutes to concentrate on something 20 feet away are two of the most popular suggestions [8]. There are several studies pertaining to CVS among university students in India, but very few studies have been done in Kolhapur district of Maharashtra. The

study's goal is to determine the prevalence of CVS and how it relates to ergonomic and behavioural risk factors among second-year MBBS students at Dr. D. Y. Patil Medical College in Kolhapur. This information could help close a gap in the local literature.

Materials and methods

2.1 Study Setting and Plan The current study was carried out in Kolhapur, Maharashtra, India's Dr. D. Y. Patil Medical College. The prevalence of Computer Vision Syndrome (CVS) and its relationship to ergonomics and behavioural factors were assessed using a cross-sectional study methodology.

2.2 Participants and Sampling Convenience sampling was used to recruit male and female second-year MBBS students. The purpose of the study were explained to all potential participants. Written informed consent was obtained after assurances of confidentiality, and participation was voluntary. Students who refused or submitted incomplete questionnaires were excluded. A total of 125 students participated, comprising 71 females (56.8%) and 54 males (43.2%).

2.3 Data Collection Procedure Data were collected using a structured Google Forms questionnaire after obtaining ethical clearance from the institutional committee. Researchers ensured all required fields were completed before submission, and incomplete forms were eliminated to maintain data quality.

2.4 Measurement Tools

Section 1 General Questions: It collected basic demographic information (age and gender) and also fundamental visual measures like wearing prescription vision glasses, or the particular type of refractive mistake.

Section 2 Digital Device Usage Habits: This interviewed the participants' digital device usage habits, including what the primary device they use was and how many years they had exposed to digital tools and how much time they spent on the device on average per day. In addition, the screen break behaviours were explored and the time spent on continuous screen use prior to initiating a screen break, and the mean duration of the rest period that follows, were documented.

Section 3 Ergonomics & Awareness: This section was dedicated to ergonomics and awareness, and assessed the participants' physical behaviours and visual hygiene during screen time. This was a segment that looked at following the 20-20-20 rule (looking at an object 20 feet away for 20 seconds every 20 minutes). Also, it collected information about their usual body posture and positioning of the screen to eye level as well as whether they use any protective devices. Lastly, it collected data on screen settings, including the participants' capabilities of adjusting the screen brightness and their preferred brightness levels.

Section 4 Study Habits: It investigated the participants' preferred methods of studying. Additionally, it assessed typical viewing distances by recording how far participants generally held their smartphones from their eyes during active use.

Based on earlier study, the research team created these questions on the spot.

Section 5 CVS-Q Questionnaire

The questionnaire employed was the original version created by Seguí et al. in 2015. The 16 questions of the questionnaire were evaluated separately for the prevalence and intensity of different ocular symptoms and diseases. Two different scales were used to evaluate each symptom. A two-point Likert scale (moderate, intense) was used to assess the severity, and a three-point Likert scale (never, occasionally, often/always) was used to assess the frequency. The evaluated symptoms were: ocular burning, ocular itching, foreign body sensation, lacrimation, excessive blinking, conjunctival hyperaemia, ocular pain, feeling of heaviness in the eyelids, blurred vision, xerophthalmia, diplopia, impaired near vision, perception of coloured halos around objects, increased photophobia, feeling of diminished vision, and cephalalgia. The CVS score for each respondent is calculated by multiplying the severity values (moderate=1, intense=2) with the repetition values (never=0, occasionally=1, often/always=2) . A person can be diagnosed with Computer Vision Syndrome (CVS) if their total score is at least six [9].

2.5 Statistical Analysis The independent samples t test, the Mann-Whitney U test, and Spearman's rank correlation were employed. A p value of less than 0.05 was considered statistically significant.

Results

3.1 Demographic Characteristics The125 subjects 20.07 ± 1.23 years old were included in the study, out of that 71 (56.8%) were female and 54 (43.2%) males. Most

(62.4%) said that they use prescription glasses and the most common refractive error was myopic (44.8%). The majority of students used mobile phones as their main device (94.4%) and almost half (49.6%) had accumulated 5-10 years of digital device use. Table 1 displays the pupils' demographic information.

Table 1: Demographic characteristics of the students

Demographic characteristics	**Frequency, n (%)**
Age (years), mean ±SD	20.07 years ± 1.23 SD
Gender Female Male	 71(56.8) 54(43.2)
Do you use prescription glasses? No Yes	 47(37.6) 78(62.4)
Which type of refractive error have you been diagnosed with? No refractive error (Emmetropia) Myopia (Near sightedness) Hyperopia (Far-sightedness) Astigmatism Not sure/Never tested	 32(25.6) 56(44.8) 21(16.8) 1(0.8) 15(12)
What digital tool do you use most frequently? Mobile Laptop and PC Tablet Television	 118(94.4) 2(1.6) 5(4) 00
Years spent utilizing digital tools (total usage use of phones, laptops, etc.) Less than 5 years 5-10 years More than 10 years	 48(38.4) 62(49.6) 15(12)

3.2 Ergonomic Practices Ergonomic Practices Daily The amount of screen time was 2-5 hours (41.6%), 5-8 hours (48.8%) and more than 8 hours (5.6%). The most common break period was 30-60 minutes of continuous use (43.2%). Only 5.6% of the students always followed the 20 20 20 rule and 21.6% did not know about it. Most of the students used devices below eye level (70.4%) and adjusted screen brightness to a comfortable level (80.8%). The distribution of ergonomic practices is presented in Table 2. The data shows hours spent per day with digital devices in Figure 1.

Table 2: Distribution of ergonomic practices of students

Ergonomic practices	**Frequency, n (%)**
How many hours a day do you use digital devices on average? Less than 2 hours 2-5 hours 5-8 hours More than 8 hours	 5(4) 52(41.6) 61(48.8) 7(5.6)
After how long of continuous digital device use do you usually take a break? Less than 30 minutes 30 minutes to 1 hour More than 1 hour	 36(28.8) 54(43.2) 35(28)
On average, how long do you rest after each continuous session of screen use? Less than 20 minutes 20 minutes to 60 minutes More than 60 minutes	 38(30.4) 62(49.6) 25(20)
How frequently do you use digital devices in accordance with the 20-20-20 rule? Always Often Sometimes Rarely Never Not aware of the rule	 7(5.6) 12(9.6) 38(30.4) 26(20.8) 15(12) 27(21.6)
What is your usual body posture while using digital devices? Sitting Lying down Both sitting and lying down	 20(16) 18(14.4) 87(69.6)
What is the level of the screen in relation to your eyes while using digital devices? Below eye level At eye level Above eye level	 88(70.4) 36(28.8) 1(0.8)
Are you able to adjust the brightness of the digital device you use? Yes No	 123(98.4) 2(1.6)
How would you describe the brightness level of your digital device screen during use? Too low Comfortable Too high	 22(17.6) 101(80.8) 2(1.6)
Do you use any protective devices while using digital screens? No Yes-Blue light blocking glasses Yes- Screen filter (Blue light filter/Anti-glare filter) Yes- Both Blue light blocking glasses and Screen filter	 57(45.6) 33(26.4) 15(12) 20(16)
What is your primary study method? Mostly textbooks/printed materials	 37(29.6) 33(26.4) 55(44)

Mostly electronic methods (digital devices) Equally from both printed and electronic sources	
How far do you typically hold your smartphone from your eyes during use? Very close (< 20 cm) Close (20–30 cm) Moderate (31–40 cm) Far (> 40 cm)	8(6.4) 62(49.6) 51(40.8) 4(3.2)

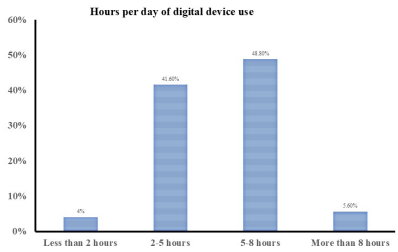

Figure .1 Hours spent using digital devices per day

3.3 CVS Symptom Prevalence The prevalence of CVS (CVS Q score ≥6) was 36.0%, with a mean score of 5.03 ± 4.64. The sexes did not significantly differ from one another (p = 0.869).

The most frequent symptoms were tearing (51.2%), headache (46.4%), itching (41.6%), foreign body sensation (40.8%), and eye pain (36.0%). Double vision (8.0%) and coloured halos (14.4%) were fewer common symptoms. The prevalence of CVS symptoms is summarized in Table 3. The frequency and intensity of symptoms are presented in Figures 2 and 3 respectively.

Table 3: Prevalence of Computer Vision Syndrome (CVS) Symptoms

Symptom	**Prevalence (%)**
Tearing	51.2%
Headache	46.4%
Itching	41.6%
Feeling of a foreign body	40.8%
Eye pain	36.0%
Burning	30.4%
Blurred vision	30.4%
Increased sensitivity to light	30.4%
Eye redness	29.6%
Dryness	27.2%
Heavy eyelids	24.8%
Excessive blinking	22.4%
Feeling that sight is worsening	18.4%
Difficulty focusing for near vision	16.8%
Coloured halos around objects	14.4%
Double vision	8.0%

3.4 Association with Ergonomic and Behavioural Factors

There is a relationship between ergonomic and behavioural factors. There is an association of ergonomic and behavioural factors.

In terms of CVS Q scores, there was a statistically significant difference between those who consistently applied the 20 20 20 rule and those who did not, but no significant differences were found using the independent samples t test. Average CVS Q score for "Always" followers (n = 7) was 1.29 ± 1.38, compared to 5.25 ± 4.67 for "Not Always" followers (n = 118), $p < 0.05$. This suggests that strict compliance with the rule is correlated with less symptoms or less severe symptoms of CVS. Table 4 shows adherence levels to the 20 20 20 rules.

There was no significant relationship found between the average hours of digital devices used on a daily basis and CVS Q score by Spearman's Rank Correlation (p = 0.296). Likewise, there was no significant relationship between the years of using digital devices and symptoms of dryness (p = 0.274). This indicates that other factors than total screen time (such as posture, brightness, blink frequency) are likely to be more important in determining the severity of CVS.

Prescription Glasses: For this sample, there were significant differences between users and non-users of prescription glasses using independent samples t test and Mann–Whitney U test for CVS Q scores. Mean score for glasses users (n = 78) was 5.68, compared to 3.96 for non-users (n = 47), p = 0.0373. This suggests that pupils with refractive errors have greater difficulties with their CVS.

Table 4: 20-20-20 Rule Adherence Statistics

Adherence Level	Count	Percentage of Total Respondents
Sometimes	38	30.4%
Rarely	26	20.8%
Not aware of the rule	27	21.6%
Never	15	12.0%
Often	12	9.6%
Always	7	5.6%

.

Table 5. Frequency and Intensity of symptoms in Computer Vision Syndrome- Questionnaire (CVS-Q)

	Reappearance of symptoms						**Symptom intensity**			
	Never (n)	**Never (%)**	**Occasionally (n)**	**Occasionally (**	**Often/always (n)**	**Often/always (**	**Moderate (**	**Moderate (**	**Intense (**	**Intense (**

				%)		**%)**	**n)**	**%)**	**n)**	**%)**
Burning	81	64.8	38	30.4	06	4.8	69	55.2	02	1.6
Itching	68	54.4	52	41.6	05	4	68	54.4	08	6.4
Feeling of a foreign body	71	56.8	51	40.8	03	2.4	67	53.6	03	2.4
Tearing	50	40	64	51.2	11	8.8	79	63.2	04	3.2
Excessive blinking	92	73.6	28	22.4	05	4	60	48	01	0.8
Eye redness	83	66.4	37	29.6	05	4	64	51.2	03	2.4
Eye pain	74	59.2	45	36	06	4.8	63	50.4	05	4
Heavy eyelids	88	70.4	31	24.8	06	4.8	58	46.4	03	2.4
Dryness	80	64	34	27.2	11	8.8	63	50.4	08	6.4
Blurred vision	76	60.8	38	30.4	11	8.8	62	49.6	03	2.4
Double vision	112	89.6	10	8	03	2.4	49	39.2	00	00
Difficulty focusing for near vision	102	81.6	21	16.8	02	1.6	54	43.2	02	1.6

Increased sensitivity to light	77	61.6	38	30.4	10	8	57	45.6	04	3.2
Coloured halos around objects	105	84	18	14.4	02	1.6	52	41.6	00	00
Feeling that sight is worsening	96	76.8	23	18.4	06	4.8	53	42.4	03	2.4
Headache	55	44	58	46.4	12	9.6	71	56.8	12	9.6

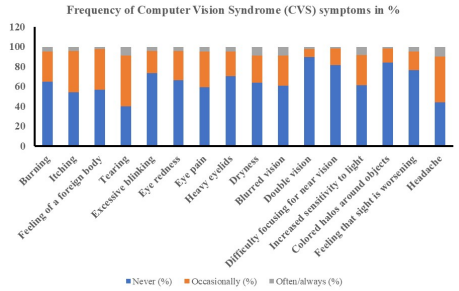

Figure 2. The percentage of people who experience symptoms of Computer Vision Syndrome (CVS).

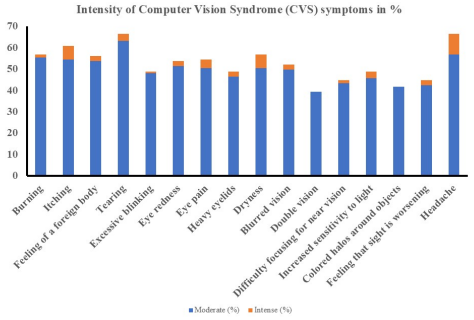

Figure 3. Computer Vision Syndrome (CVS) symptom severity as a percentage (%).

4. Discussion

The current study sought to determine the prevalence of Computer Vision Syndrome (CVS) among second-year MBBS students at Dr. D. Y. Patil Medical College in Kolhapur, Maharashtra, as well as ergonomic and behavioural risk factors linked to CVS. The results showed that 36% of the participants had a CVS-Q score ≥6, which means they had CVS. The result indicates that digital eye strain is a significant health problem in medical school students who are increasingly using digital devices for educational and recreational activities. Other studies done on university students have also found a high prevalence of CVS related to an increase in digital screen use [10,11]. The overall CVS-Q score in the current study was 5.03 ± 4.64, pointing to a low to moderate level of symptom burden, but having a wide range of scores among the participants. The prevalence seen in this study is a little lower than that of several earlier studies done in medical and University students. The prevalence rate may differ from one study to another because of the variations in the definition of CVS, study population, duration of exposure to digital devices, and awareness about preventive measures [12].S

There were no significant differences between males and females in CVS-Q scores in the present study ($p = 0.869$). In the present study, no significant association was found with gender, indicating that gender alone is not an independent risk factor for CVS in medical students, which aligns with some other previous studies [13,14]. However, there are other studies which reported higher prevalence among the females, due to hormonal effect on tear film stability and dry eye symptoms.

The most frequent symptoms reported by participants were tearing (51.2%), headache (46.4%), itching (41.6%), sensation of a foreign body (40.8%) and eye pain (36%). Extended screen viewing has been associated with a decrease in blink rate and an increase in tear evaporation, which can cause irritation to the ocular surface and reflex tearing, and headache and eye discomfort can occur as a result of continuously having to accommodate while using a digital device, glare, and bad work habits when close work is prolonged [15,16]

One important finding of the current study was a statistically significant correlation between lower CVS-Q scores and adherence to the 20-20-20 guideline. The average CVS-Q score was significantly lower for participants who always followed the 20-20-20 rule compared to participants who did not consistently follow the 20-20-20 rule. Just 5.6% of participants consistently followed the 20-20-20 rule, and those who were aware of it were not doing so. This implies that teaching kids about the elements of eye care prevention is necessary [18].

Interestingly, the present study did not obtain statistically significant results on the correlation between total daily screen time and CVS-Q scores ($p = 0.296$). Likewise, years of digital device use were not significantly related to dryness symptoms. These results indicate that additional factors such as posture, brightness of the screen, distance to a screen, blink frequency and the length of time spent without a blink may be more important in the etiology of CVS than screen time alone. Previous studies have reported similar findings where ergonomic factors were the focus of discussion, not the amount of screen time [19]. In the present study, there was also a significant difference between the CVS-Q scores of the participants with prescription glasses and those without prescription glasses ($p = 0.0373$). This implies that pupils who are refractive may be at a higher risk of getting digital eye strain. Myopia was the most frequently reported refractive errors of the participants. Previous studies have also shown that refractive errors and their uncorrected or insufficient correction can also lead to visual fatigue and aggravation of CVS symptoms during prolonged near work [20].

When it comes to ergonomic practices, the majority of students say they use digital devices when sitting and lying, while most use screens below eye level. Almost half of participants had smart phones at 20-30 cm viewing distance, which could create an eye strain and accommodate stress. The adverse effects of poor posture and incorrect viewing distances are known factors that can contribute to digital viewing-related eye and musculoskeletal problems [21].

The results of this study highlight the need to educate medical students on the importance of digital eye health. The focus of education should be on proper ergonomics, optimum positioning of screens, proper viewing distance, regular blinking and keeping to the 20-20-20 rule to reduce prevalence and severity of CVS symptoms. In medical education, the use of digital learning is growing and as such, institutions should promote the adoption of healthy digital habits and the need for periodic ophthalmic evaluation of students. There are some limitations in the present study. Convenience sampling and self-reported questionnaire data could cause recall and reporting bias. Another limitation of the study is that these data are cross-sectional and do not allow for causal inferences of the relationship between risk factors and CVS. In addition, this research was done in one institution and with a small sample size, which might not ensure the generalizability of the results. The study, however, has its limitations and still offers significant baseline data for future studies on CVS among medical students in this district, the literature of which is limited.

To conclude, CVS is common among the second year MBBS students and many of the factors are modifiable which includes ergonomic and behavioral changes. Medical students' knowledge of preventive measures, particularly the 20-20-20 rule and ergonomic practices, could be useful in reducing the number and intensity of CVS symptoms.

5. Conclusion

It is proved in the present study that Computer Vision Syndrome (CVS) is one of the common problems in second year MBBS students that more than one third students are affected with the Computer Vision Syndrome. The results indicate that changes in ergonomic and behavioural factors such as following the 20-20-20 rule, using proper posture, positioning the screen correctly, and being aware of digital eye care are important to reduce the incidence and severity of CVS symptoms. It was not found that screen time was significantly related with the severity of CVS, but it was found that refractive errors and the use of prescription glasses was related to higher symptom scores. The findings highlight the need to incorporate preventive measures and ergonomic education into medical education to ensure that students' eye health is protected in the digital age.

6. Conflict of Interest

Conflict of Interest: The authors declare no conflict of interest.

7. Funding Statement

Funding: No external funding was received for this study.

8. Ethics Statement

Ethics approval: The study was conducted after obtaining ethical clearance from the Institutional Ethics Committee of Dr. D. Y. Patil Medical College, Kolhapur. Written informed consent was obtained from all participants prior to data collection.

9. References

1. American Optometric Association. Computer vision syndrome [Internet]. St Louis: American Optometric Association; 2017 [cited 2022 Feb 22]
2. Pavel IA, Bogdanici CM, Donica VC, Anton N, Savu B, Chiriac CP, et al. Computer vision syndrome: an ophthalmic pathology of the modern era. *Medicina*. 2023;59(2):412.
3. Galindo-Romero C, Rodríguez-Zamora CL, García-Ayuso D, Di Pierdomenico J, Valiente-Soriano FJ. Computer vision syndrome-related symptoms in presbyopic computer workers. *Int Ophthalmol*. 2023;43(9):3237–45.
4. Kaur K, Gurnani B, Nayak S, Deori N, Kaur S, Jethani J, et al. Digital eye strain: a comprehensive review. *Ophthalmol Ther*. 2022;11(5):1655–80.
5. Seresirikachorn K, Thiamthat W, Sriyuttagrai W, Soonthornworasiri N, Singhanetr P, Yudtanahiran N, et al. Effects of digital devices and online learning on computer vision syndrome in students during the COVID-19 era: an online questionnaire study. *BMJ Paediatr Open*. 2022;6(1):e001429.
6. Almudhaiyan TM, Aldebasi T, Alakel R, Marghlani L, Aljebreen A, Moazin OM. The prevalence and knowledge of digital eye strain among undergraduates in Riyadh, Saudi Arabia. *Cureus*. 2023;15(4):e37081.
7. Peter RG, Giloyan A, Harutyunyan T, Petrosyan V. Computer vision syndrome (CVS): prevalence and associated risk factors among students of the American University of Armenia. *J Public Health*. 2025;33(8):1703–12.
8. Qolami M, Mirzajani A, Ronda-Pérez E, Cantó-Sancho N, Seguí-Crespo M. Translation, cross-cultural adaptation and validation of the Computer Vision Syndrome Questionnaire into Persian (CVS-Q FA©). *Int Ophthalmol*. 2022;42(11):3407–20.
9. Seguí MM, 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;68(6):662–73.
10. Rosenfield M. Computer vision syndrome: a review of ocular causes and potential treatments. *Ophthalmic Physiol Opt*. 2011;31(5):502–15.
11. Logaraj M, Madhupriya V, Hegde SK. Computer vision syndrome and associated factors among medical and engineering students in Chennai. *Ann Med Health Sci Res*. 2014;4(2):179–85.
12. Ranasinghe P, Wathurapatha WS, Perera YS, Lamabadusuriya DA, Kulatunga S, Jayawardana N, et al. Computer vision syndrome among computer office workers in a developing country: prevalence and risk factors. *BMC Res Notes*. 2016;9:150.
13. Dessie A, Adane F, Nega A, Wami SD, Chercos DH. Computer vision syndrome and associated factors among computer users in Debre Tabor Town, Northwest Ethiopia. *J Environ Public Health*. 2018;2018:4107590.
14. Portello JK, Rosenfield M, Bababekova Y, Estrada JM, Leon A. Computer-related visual symptoms in office workers. *Ophthalmic Physiol Opt*. 2012;32(5):375–82.
15. Gowrisankaran S, Sheedy JE. Computer vision syndrome: a review. *Work*. 2015;52(2):303–14.
16. Blehm C, Vishnu S, Khattak A, Mitra S, Yee RW. Computer vision syndrome: a review. *Surv Ophthalmol*. 2005;50(3):253–62.
17. Tsubota K, Nakamori K. Dry eyes and video display terminals. *N Engl J Med*. 1993;328(8):584.
18. American Optometric Association. Computer vision syndrome [Internet]. St Louis: American Optometric Association; 2023 [cited 2026 May 19]. Available from: https://www.aoa.org
19. Akinbinu TR, Mashalla YJ. Impact of computer technology on health: computer vision syndrome (CVS). *Med Pract Rev*. 2014;5(3):20–30.
20. Mohan A, Sen P, Shah C, Jain E, Jain S. Prevalence and risk factor assessment of digital eye strain among children using online e-learning during the COVID-19 pandemic: Digital eye strain among kids (DESK study-1). *Indian J Ophthalmol*. 2021;69(1):140–4.
21. Anshel JR. Visual ergonomics in the workplace. *AAOHN J*. 2007;55(10):414–20.