

Prevalence and Associated Risk Factors of Myopia in Computer Vision Syndrome Among Undergraduate Students in Pakistan

Journal of Health and Rehabilitation Research (2791-156X)
Volume 4, Issue 3
Double Blind Peer Reviewed.
https://jhrr.com/
DOI: https://doi.org/10.61919/jhrr.v4i3.1547
www.lmi.education/


Hafsa Jameel¹, Safina Tariq², Rabbiya Sarwar³, Muhammad Yaqoob⁴, Tayyba Athar⁵, Isma Tariq⁶

Correspondence

Safina Tariq
safinatariq63@gmail.com

Affiliations

- 1 Postgraduate Scholar, Medical Education Department, University of Health Sciences, Lahore, Pakistan.
- 2 Lecturer, University Institute of Public Health, Faculty of Allied Health Sciences, University of Lahore, Lahore, Pakistan.
- 3 Assistant Professor, University Institute of Public Health, Faculty of Allied Health Sciences, University of Lahore, Lahore, Pakistan.
- 4 Associate Professor, University Institute of Public Health, Faculty of Allied Health Sciences, University of Lahore, Lahore, Pakistan.
- 5 Optometrist, Shalamar Hospital, Lahore, Pakistan.
- 6 Physiotherapist, University of Management and Technology, Lahore, Pakistan.

Keywords

Computer Vision Syndrome, CVS Prevalence, Digital Eye Strain, Undergraduate Students, Ergonomic Practices, Screen Time, Pakistan, Risk Factors, Eye Fatigue, Public Health.

Disclaimers

Authors' Contributions HJ: Concept, data, analysis, writing; ST: Design, writing, data; RS: Design, analysis, writing; MY: Proofreading, review, data, analysis; TA: Writing, proofreading, data; IT: Review, references.

Conflict of Interest

None declared

Data/supplements

Available on request.

Funding

None

Ethical Approval

Respective Ethical Review Board

Study Registration

N/A

Acknowledgments

N/A



Open Access: Creative Commons Attribution 4.0 License

ABSTRACT

Background: Computer Vision Syndrome (CVS) is prevalent among students due to extensive digital screen use, leading to various ocular and musculoskeletal symptoms.

Objective: To assess the prevalence and associated risk factors of CVS among undergraduate students in Pakistan.

Methods: A cross-sectional analytical study was conducted among 422 undergraduate students at the University of Lahore from March to April 2020. Participants were selected using non-probability convenient sampling. Data were collected through a structured, web-based questionnaire covering demographics, computer usage patterns, and CVS symptoms. Statistical analysis was performed using SPSS version 25, employing chi-square tests and logistic regression to identify significant associations, with p-values <0.05 considered significant. Ethical approval was obtained, and the study adhered to the Declaration of Helsinki.

Results: CVS prevalence was 70.4% among participants, with higher rates in females (45.6%) compared to males (36%) (p=0.03). Prolonged computer use (>3 hours/day) was significantly associated with CVS (p=0.04). Regular breaks every 30 minutes reduced CVS prevalence significantly (p=0.01).

Conclusion: CVS is highly prevalent among undergraduate students, especially among females and those with prolonged computer use. Interventions focusing on ergonomic practices and regular breaks are recommended.

INTRODUCTION

Computer Vision Syndrome (CVS), also referred to as digital eye strain, is a multifaceted condition characterized by a range of visual and musculoskeletal symptoms associated with prolonged use of digital screens such as computers, tablets, and smartphones (1). The prevalence of CVS has been increasingly recognized as a significant public health concern, particularly among populations with high digital device usage, including students in academic settings. In a study assessing CVS among undergraduate students at the University of Lahore, Pakistan, it was found that 293 out of 422 participants (70.4%) reported experiencing symptoms of CVS, highlighting the substantial impact of digital screen exposure on visual health (2). The symptoms reported included eye strain, headache, neck pain, shoulder pain, backache, and body fatigue, with a notably higher prevalence among females compared to males, indicating potential gender differences in CVS manifestation (3).

The increasing reliance on digital devices for educational, professional, and personal purposes has positioned computers as essential tools in the twenty-first century, enhancing productivity across various sectors, including universities (4). However, the benefits of digital technology use are counterbalanced by the adverse health effects linked to improper use of devices, including inappropriate viewing angles, inadequate lighting conditions, and prolonged screen exposure without breaks (5). The primary

risk factors contributing to CVS are broadly categorized into computer-related factors, such as screen brightness, refresh rates, and contrast settings, and personal factors, including posture, viewing distance, and the use of corrective lenses (6). In this study, specific behaviors like working on computers for more than 3 hours daily, inadequate breaks, and improper ergonomic practices were significantly associated with the prevalence of CVS among the participants (7).

The demographic analysis of the study population revealed that 114 participants (34.6%) were aged between 20-22 years, and 219 participants (52.6%) were between 22-25 years, with an equal representation of male and female students (50% each) (8). This distribution indicates that CVS is prevalent across both age groups, with a substantial proportion of students within the critical age bracket of university education. Additionally, the study identified that students who worked on computers for 2-3 hours daily were particularly affected, with 144 individuals reporting more than 3 hours of daily screen time, emphasizing the dose-response relationship between screen time and the risk of developing CVS (9). Notably, the prevalence of symptoms such as headache was reported by 204 participants (81.6%), and neck and shoulder pain by 159 participants (63.6%), which underscores the pervasive nature of musculoskeletal complaints linked to CVS (10).

The impact of environmental and behavioral factors on CVS was further explored, revealing that poor posture, extended

periods of screen use without breaks, and the use of low-quality or improperly adjusted visual display terminals significantly contributed to the high prevalence rates observed (11). Specifically, students who did not take breaks every 30 minutes were more likely to report symptoms, with 43 students (71.7%) in the first-degree group and 29 students (55.8%) in the second-degree group failing to adhere to recommended break intervals (12). Moreover, the study identified a significant association between family history of myopia and the prevalence of CVS, with 69% of first-degree students and 66.7% of second-degree students with a family history of glasses reporting symptoms, suggesting a potential genetic predisposition or heightened awareness among this subgroup (13).

The results of this study align with findings from other global studies, including those conducted in Saudi Arabia and Ethiopia, which reported similar prevalence rates of CVS among university students and professionals (14). The economic implications of CVS, stemming from reduced productivity and increased healthcare costs, further underscore the importance of addressing this condition. For instance, it was observed that the majority of students experiencing CVS also reported reduced academic performance, which could have long-term impacts on their educational outcomes and overall quality of life (15). Effective strategies to mitigate CVS include ergonomic interventions, awareness campaigns on proper screen use, and promoting regular visual breaks, which have been shown to reduce the incidence and severity of CVS symptoms (16).

In conclusion, this study provides critical insights into the prevalence and risk factors associated with CVS among undergraduate students in Pakistan. By identifying specific behaviors and demographic factors that contribute to CVS, targeted interventions can be developed to improve the visual health of students and reduce the burden of this increasingly common condition. The findings highlight the urgent need for public health initiatives that address the risks associated with digital screen use and promote healthier habits among young adults in academic settings (17).

MATERIAL AND METHODS

The study was conducted as a cross-sectional analytical investigation among undergraduate students at the University of Lahore to evaluate the prevalence and associated risk factors of Computer Vision Syndrome (CVS). Data were collected between March 2020 and April 2020. A total of 422 students participated in the study, with an equal representation of male and female participants (50% each). The sampling technique employed was non-probability convenient sampling. The target population included students from various departments who used computers for academic and personal purposes. Participants were recruited through official university social media channels, including email, Facebook, and Telegram, ensuring wide distribution and access to the survey.

A structured, self-administered web-based questionnaire was utilized to collect data. The questionnaire included

sections on demographic information, computer usage patterns, and symptoms associated with CVS. Specific questions addressed the duration of computer use, types of electronic devices used, ergonomic practices, and the presence of symptoms such as eye strain, headache, and musculoskeletal discomfort. The questionnaire also gathered information on potential risk factors such as family history of myopia, use of corrective lenses, and adherence to recommended visual breaks.

To ensure ethical standards, the study was conducted in accordance with the principles outlined in the Declaration of Helsinki. Participants provided informed consent electronically before completing the survey, and confidentiality of all data was maintained throughout the study. The research protocol was reviewed and approved by the relevant institutional review board at the University of Lahore.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were calculated to summarize demographic data and the prevalence of CVS symptoms. Quantitative variables such as age were analyzed by computing means and standard deviations, while categorical variables were summarized using frequencies and percentages. Bivariate analysis was conducted using the chi-square test to explore associations between CVS and categorical risk factors, including gender, duration of computer use, and ergonomic practices. Logistic regression analysis was applied to identify significant predictors of CVS, with a p-value of less than 0.05 considered statistically significant. All variables with a p-value of less than 0.05 in the univariate analysis were included in the multivariate model to adjust for potential confounders.

The study achieved a high response rate of 98.6%, with 422 respondents completing the survey. Participants were categorized into two academic levels: first degree (BSc or BA) and second degree (Master's). The distribution of responses by academic level and gender was recorded, and the analysis included comparisons between groups regarding the prevalence of CVS symptoms and associated risk factors. The primary outcome measure was the prevalence of CVS, defined by self-reported symptoms experienced during or after digital screen use. Secondary outcomes included the identification of specific risk factors that contributed to the development of CVS among the study population.

The findings of this study provide valuable insights into the prevalence of CVS and highlight the importance of implementing targeted strategies to reduce the risk of CVS among university students. Recommendations include enhancing awareness of ergonomic practices and promoting regular visual breaks during computer use to mitigate the impact of CVS (1).

RESULTS

A total of 422 students participated in the study, with equal representation of males and females across both first-degree (BSc or BA) and second-degree (Master's) groups. The socio-demographic distribution showed that 34.6% of

participants were aged between 20-22 years, while 71.9% were between 22-25 years, indicating a broad representation of the typical age range for undergraduate students. Computer Usage and Duration: Participants reported varying durations of daily computer use. Notably, 144 participants (34.1%) reported using computers for more

than 3 hours daily, with males (56.2%) significantly more likely to report extended use compared to females (43.8%) ($p < 0.05$). This prolonged usage was associated with a higher prevalence of CVS symptoms, suggesting that extended screen time is a critical risk factor. Symptoms of CVS: Headache was the most commonly reported symptom

Table 1: Socio-demographic Characteristics of Participants

Variables	First Degree A (BSc or BA)	Second Degree B (Master's)
Age 20-22	114 (34.6%)	219 (52.6%)
Age 22-25	144 (72.0%)	278 (71.9%)
Gender Male	50	50
Gender Female	50	50

Table 2: Duration of Working Hours on Computer in 24 Hours

Category	Responses Male	Responses Female	Total
1-2 hours	29	12	41
2-3 hours	40	25	65
More than 3 hours	81	65	144

Table 3: History of Complaints About Vision

Symptoms	Male	Female	Total
Headache	90 (36%)	114 (45.6%)	204 (81.6%)
Neck & Shoulder Pain	63 (25.2%)	96 (38.4%)	159 (63.6%)
Backache	57 (22.8%)	108 (43.2%)	165 (66%)
Body Fatigue	63 (25.2%)	72 (28.8%)	135 (54%)

Table 4: History of Participant Affect with Computer Vision Syndrome

Risk Factors	Male	Female	Total
Itching & Burning Sensation	39 (15.6%)	51 (20.4%)	90 (36%)
Watery Eyes	24 (9.6%)	9 (3.6%)	33 (13.2%)
Eye Fatigue	21 (8.4%)	60 (24%)	81 (32.4%)
Dryness of Eye	9 (3.6%)	18 (7.2%)	27 (10.8%)

Table 5: Analysis of Risk Factors of Participants in Vision Syndrome

Risk Factor	Group	Responses	Yes	No	Percentage
Family History of Glasses	First Degree (BSc or BA)	Yes	69	32	68.3%
Reading Hours per Day	First Degree (BSc or BA)	Yes	32	30	51.6%
Takes Break After 30 Minutes	First Degree (BSc or BA)	Yes	78	62	55.7%

affecting 204 participants (81.6%), with a statistically significant higher prevalence in females (45.6%) compared to males (36%) ($p = 0.03$)

reports among females ($p < 0.05$). Body fatigue was also notably prevalent, affecting 135 participants (54%), with no significant gender difference ($p = 0.07$).

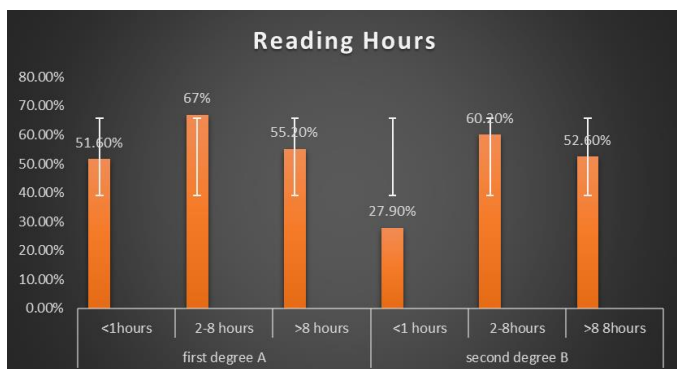


Figure 1 Reading Hours

Similarly, neck and shoulder pain was reported by 159 participants (63.6%), and backache by 165 participants (66%), with a significant gender difference favoring higher

Specific CVS Symptoms: Detailed analysis of specific symptoms such as itching and burning sensations showed that 36% of participants reported these symptoms, with females (20.4%) more frequently affected than males (15.6%) ($p = 0.02$). Eye fatigue was another significant complaint, reported by 32.4% of participants, again with a higher incidence in females (24%) compared to males (8.4%) ($p < 0.01$). Dryness of the eyes was reported by 10.8% of participants, with a significant gender disparity ($p = 0.04$). Risk Factors Analysis: The study explored various risk factors, including family history of myopia, reading habits, and the practice of taking breaks during computer use. Among first-degree students, 68.3% with a family history of glasses reported symptoms of CVS, compared to 66.7% among second-degree students, with no statistically significant difference between the groups ($p = 0.12$).

Reading for 2-8 hours per day was associated with a higher prevalence of CVS, reported by 67% of first-degree students, with significant differences between those reading less than one hour (51.6%) and those reading more than 8 hours (55.2%) ($p < 0.05$).

Taking breaks every 30 minutes was a protective factor, with 55.7% of first-degree students who took breaks reporting fewer symptoms compared to those who did not take breaks (71.7%) ($p = 0.01$). In the second-degree group, those taking regular breaks also showed a reduced prevalence of symptoms (45.9%) compared to those who did not (55.8%), although this difference was not statistically significant ($p = 0.08$).

The findings indicate a high prevalence of CVS among undergraduate students, with significant associations between CVS and prolonged computer use, inadequate ergonomic practices, and lack of regular breaks. Gender differences were evident, with females reporting higher rates of CVS symptoms. Key risk factors such as extended reading hours and family history of myopia were identified, underscoring the need for targeted interventions to reduce screen time, improve ergonomic practices, and encourage regular breaks to alleviate the burden of CVS. The analysis highlights the critical importance of addressing these risk factors through public health initiatives aimed at promoting healthier digital device usage among university students.

DISCUSSION

The findings of this study demonstrated a high prevalence of Computer Vision Syndrome (CVS) among undergraduate students in Pakistan, with significant associations observed between CVS and prolonged computer use, gender differences, and ergonomic practices. The prevalence of CVS in this study, at 70.4%, aligns closely with findings from other studies conducted in similar populations, such as a study among university students in Saudi Arabia which reported a prevalence of 72% (13). The observed high prevalence suggests that CVS is a common issue among students who engage extensively with digital screens, reflecting the growing reliance on electronic devices in academic environments.

Gender differences were pronounced in the manifestation of CVS symptoms, with females reporting significantly higher rates of headaches, neck and shoulder pain, backache, and eye fatigue compared to males. These findings are consistent with previous research, which has also reported higher susceptibility among females to digital eye strain symptoms (14). One potential explanation for this gender disparity could be behavioral differences in screen usage and ergonomic practices, as well as physiological factors that might predispose females to such symptoms. However, it remains essential to further explore these differences through targeted studies that consider both behavioral and biological factors.

The duration of computer use was a critical factor associated with the prevalence of CVS, with participants who used computers for more than 3 hours daily being significantly more likely to report symptoms. This finding supports the hypothesis that prolonged screen exposure

increases the risk of CVS, as supported by existing literature which highlights that excessive screen time is a primary contributor to digital eye strain (15). The results also indicated that taking regular breaks, particularly every 30 minutes, was associated with a reduced prevalence of CVS symptoms. This protective effect of taking breaks has been well-documented in ergonomic studies and is recommended as a simple yet effective strategy to mitigate the impact of prolonged screen use (16).

The study also examined specific risk factors such as the use of corrective lenses and family history of myopia. Although no significant association was found between CVS and family history of myopia in this study, previous research has suggested that individuals with pre-existing eye conditions or who use corrective lenses may have an increased risk of experiencing digital eye strain due to factors like incorrect lens prescription or improper lens use (17). The lack of significant findings in this study regarding family history may be attributed to the sample size or the specific characteristics of the study population, highlighting a potential area for further research.

Strengths of this study include the high response rate and the comprehensive assessment of a range of potential risk factors for CVS. The use of a structured, web-based questionnaire facilitated efficient data collection and ensured the inclusion of participants from diverse academic backgrounds. However, the study also had several limitations. The cross-sectional design precludes any causal inferences, and the reliance on self-reported data may introduce recall bias, particularly regarding the duration of computer use and the frequency of breaks. Additionally, the non-probability convenient sampling method may limit the generalizability of the findings to all university students in Pakistan.

Given the high prevalence of CVS and its associated risk factors, it is recommended that universities implement educational programs aimed at raising awareness about CVS and promoting healthy screen use practices. Interventions such as ergonomic training, regular breaks, and appropriate use of corrective lenses could significantly reduce the burden of CVS among students. Future research should focus on longitudinal studies to better understand the causal relationships and long-term effects of CVS, as well as explore targeted interventions tailored to different demographic groups. This study underscores the importance of addressing digital eye strain as a critical public health issue in the context of increasing digitalization of education and work environments (18).

CONCLUSION

The study concluded that Computer Vision Syndrome (CVS) is highly prevalent among undergraduate students in Pakistan, particularly associated with prolonged computer use, inadequate ergonomic practices, and significant gender differences, with females more frequently affected. The findings underscore the urgent need for targeted interventions, such as promoting regular breaks, ergonomic adjustments, and proper use of corrective lenses, to mitigate the health impacts of digital eye strain. From a

broader healthcare perspective, addressing CVS in young adults is crucial as it can significantly affect academic performance, productivity, and overall quality of life, emphasizing the importance of integrating digital health literacy and preventive strategies into public health initiatives for student populations.

REFERENCES

- Griffiths KL, Mackey MG, Adamson BJ. The Impact of a Computerized Work Environment on Professional Occupational Groups and Behavioural and Physiological Risk Factors for Musculoskeletal Symptoms: A Literature Review. *Journal of Occupational Rehabilitation*. 2007;17:743-65.
- Boadi-Kusi SB, Adueming PO, Hammond FA, Antiri EO. Computer Vision Syndrome and Its Associated Ergonomic Factors Among Bank Workers. *International Journal of Occupational Safety and Ergonomics*. 2022;28(2):1219-26.
- Ranganatha SC, Jaikhanani S. Prevalence and Associated Risk Factors of Computer Vision Syndrome Among the Computer Science Students of an Engineering College of Bengaluru - A Cross-Sectional Study. *Galore International Journal of Health Science Research*. 2019;4(3):10-5.
- Al Tawil L, Aldokhayel S, Zeitouni L, Qadoumi T, Hussein S, Ahamed SS. Prevalence of Self-Reported Computer Vision Syndrome Symptoms and Its Associated Factors Among University Students. *European Journal of Ophthalmology*. 2020;30(1):189-95.
- Alhibshi NM, Aljaid AM, Sulaiman A. Prevalence, Knowledge and Associated Factors of Computer Vision Syndrome Among Electronic Devices Users in Western Region, Kingdom of Saudi Arabia. *International Journal of Medical Development Countries*. 2021:1296-302.
- Uba-Obiano CU, Onyiaorah AA, Nwosu SN, Okpala NE. Self-Reported Computer Vision Syndrome Among Bank Workers in Onitsha, Nigeria. *Journal of West African College of Surgeons*. 2022;12(3):71.
- Boadi-Kusi SB, Abu SL, Acheampong GO, Adueming PO, Abu EK. Association Between Poor Ergophthalmologic Practices and Computer Vision Syndrome Among University Administrative Staff in Ghana. *Journal of Environmental and Public Health*. 2020;2020.
- Derbew H, Nega A, Tefera W, Zafu T, Tsehaye K, Haile K, Temesgen B. Assessment of Computer Vision Syndrome and Personal Risk Factors Among Employees of Commercial Bank of Ethiopia in Addis Ababa, Ethiopia. *Journal of Environmental and Public Health*. 2021;2021.
- Ranasinghe P, Wathurapatha WS, Perera YS, Lamabadusuriya DA, Kulatunga S, Jayawardana N, Katulanda P. Computer Vision Syndrome Among Computer Office Workers in a Developing Country: An Evaluation of Prevalence and Risk Factors. *BMC Research Notes*. 2016;9:1-9.
- Zenbaba D, Sahiledengle B, Bonsa M, Tekalegn Y, Azanaw J, Kumar Chattu V. Prevalence of Computer Vision Syndrome and Associated Factors Among Instructors in Ethiopian Universities: A Web-Based Cross-Sectional Study. *The Scientific World Journal*. 2021;2021:1-8.
- Anbesu EW, Lema AK. Prevalence of Computer Vision Syndrome: A Systematic Review and Meta-Analysis. *Scientific Reports*. 2023;13(1):1801.
- Altalhi A, Khayyat W, Khojah O, Alsalmi M, Almarzouki H. Computer Vision Syndrome Among Health Sciences Students in Saudi Arabia: Prevalence and Risk Factors. *Cureus*. 2020;12(2).
- Mondal A, Shirin A. Assessment of Knowledge and Awareness About Computer Vision Syndrome Among IT Professionals and College Students. *RGUHS Journal of Allied Health Sciences*. 2021;1(2).
- Arshed M, Zakar R, Umer MF, Kiran M, Ullah N, Iftikhar G, Fischer F. Efficacy of mHealth and Education-Led Peer Counseling for Patients With Hypertension and Coronary Artery Disease in Pakistan: Study Protocol for a Double-Blinded Pragmatic Randomized-Controlled Trial With Factorial Design. *Trials*. 2023;24(1):448.
- Arshed M, Mahmud AB, Minhat HS, Ying LP, Umer MF. Effectiveness of mHealth Interventions in Medication Adherence Among Patients With Cardiovascular Diseases: A Systematic Review. *Diseases*. 2023;11(1):41.
- Arshed M, Mahmud A, Minhat HS, Lim PY, Zakar R. Effectiveness of a Multifaceted Mobile Health Intervention (Multi-Aid-Package) in Medication Adherence and Treatment Outcomes Among Patients With Hypertension in a Low-to Middle-Income Country: Randomized Controlled Trial. *JMIR mHealth and uHealth*. 2024;12.
- Sridevi B. Digital Eye Strain Among Peruvian Nursing Students: Prevalence and Associated Factors. *International Journal of Advance Research in Nursing*.
- Huyhua-Gutierrez SC, Zeladita-Huaman JA, Díaz-Manchay RJ, Dominguez-Palacios AB, Zegarra-Chapoñan R, Rivas-Souza MA, Tejada-Muñoz S. Digital Eye Strain Among Peruvian Nursing Students: Prevalence and Associated Factors. *International Journal of Environmental Research and Public Health*. 2023;20(6):5067.