ORIGINAL ARTICLE

Computer Vision Syndrome Among Computer Users in Muzaffarabad, Azad Jammu and Kashmir

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ABSTRACT

Objective: To determine the prevalence of Computer Vision Syndrome (CVS) among computer users in Muzaffarabad, Azad Jammu and Kashmir.

Study Design: Cross-sectional observational study.

Place and Duration of Study: Department of Ophthalmology, Abbas Institute of Medical Sciences (AIMS), Muzaffarabad from April 1, 2022 to September 30, 2022.

Materials and Methods: A cross-sectional study was conducted among 346 computer users aged 18–40 years, using digital devices. Participants with pre-existing eye disease (e.g., glaucoma, cataract, dry eye), or pregnancy were excluded. Quantitative data included age, screen time, duration of use, and symptom frequency, while qualitative data covered demographic characteristics, work environment, and subjective experiences of eye strain. Data were entered and analyzed using SPSS version 26. Descriptive statistics such as means, standard deviations, and frequencies were computed and associations between categorical variables (e.g., screen time and CVS symptoms) were analyzed. A p-value ≤ 0.05 was considered statistically significant.

Results: CVS symptoms were reported by 63.5% of respondents. Ocular complaints were more frequent (65%) than extra-ocular (35%), with eye fatigue (37.8%) and headaches (42.7%) being the most common symptoms. Neck or shoulder pain was reported by 33.4% of symptomatic individuals. Most users (62.1%) preferred medium screen brightness, and symptom relief was universally reported with increased screen breaks, although no statistically significant correlation was found between break frequency and symptom severity.

Conclusion: We found computer vision syndrome in 63.5% of who use electronic devices. These findings underscore the need for targeted ergonomic interventions and public education on safe screen practices.

Key Words: *Computer Vision Syndrome, Digital Eye Strain, Headache, Neck Pain, Screen time.*

Introduction

The abundant integration of electronic devices, particularly computers and mobile phones, has become an essential aspect of modern life. Beyond personal use, digital technology has saturated professional fields workplaces, educational institutions, recreational centers, and homes now rely heavily on screen-based interfaces. Professions such as accounting, graphic design, banking, engineering, air traffic control, and journalism depend on prolonged screen exposure, making digital visual tasks a central aspect of occupational performance. Globally, it is estimated that between 45 and 70 million people spend significant portions of their workday in front of screens, contributing to a surge in visual and musculoskeletal complaints categorized under computer vision syndrome (CVS).[1]

CVS is a cluster of ocular and extra-ocular symptoms resulting from sustained exposure to digital screens. These symptoms are broadly classified into visual (e.g., blurred vision, focusing difficulties), ocular surface (e.g., dryness, irritation), asthenopic (e.g., eye fatigue, strain), and extra-ocular (e.g., headaches, neck or shoulder pain) categories.[2] Extended screen use may impair accommodative function and exacerbate symptoms, particularly in the presence of poor posture, incorrect viewing angles, uncorrected refractive errors, dry eyes, or

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environmental discomfort.[3] Numerous risk factors further heighten CVS vulnerability. Chief among them is prolonged screen time without adequate breaks, poor ergonomic practices, inadequate lighting, digital multitasking, and pre-existing ocular conditions such as dry eye or uncorrected vision.[4]

Recent systematic reviews confirm that CVS is a global public health concern, with pooled prevalence rates ranging between 60% and 70%.[4,5] During the COVID-19 pandemic, this figure rose to approximately 74% due to increased reliance on remote work and online education.[6] Prevalence varies by population and region, with particularly high rates observed among university students, healthcare workers, and IT professionals.[7]

Pakistan has been identified as having one of the highest recorded CVS prevalence rates globally. A meta-analysis by Noreen *et. al.,*[8] reported high prevalence of CVS at 98.7% among participants in Pakistani computer users, especially among student and office-based cohorts. This alarming figure likely stems from extended screen exposure, low awareness of preventive strategies, limited access to eye care, and suboptimal workstation ergonomics.[3] Azad Jammu and Kashmir (AJK) reflects these national trends but remains underrepresented in research. The aim of this study was to fill that gap by quantifying CVS prevalence among computer users in Muzaffarabad, AJK by identifying risk factors and symptom patterns specific to the region. This study was designed for public education initiatives, ergonomic reforms, and its access to eye care services.

Materials and Methods

A cross-sectional observational study was conducted over a six-month period from April 1, 2022 to September 30, 2022 in the Department of Ophthalmology at Abbas Institute of Medical Sciences (AIMS), Muzaffarabad. The study received ethical approval from the Institutional Review Committee (AJKMC/HRC/2023-12) and written informed consent was obtained from all participants. Sample size was determined using the OpenEpi sample size calculator (version 3.01), applying a 95% confidence level, 5% margin of error, and a conservatively estimated prevalence of 70% based on findings from systematic reviews and national-level studies.[4,5] A total of 384 participants was initially selected using non-probability purposive sampling.

Data were collected using a structured, self-administered questionnaire adapted from the Computer Vision Syndrome Questionnaire (CVS-Q©), originally developed and validated by Seguí *et. al.,*[2,3] and it has demonstrated good internal consistency (Cronbach's $\alpha = 0.87$) and test-retest reliability ($\kappa = 0.81$), making it a reliable tool for assessing digital eye strain symptoms. It gathered information on participant demographics (age, gender, occupation), screen usage patterns (daily hours, device type), and the presence and frequency of CVS-related symptoms.

Inclusion criteria included adults aged 18 to 40 years who had used a digital screen for a minimum of one hour daily during the past month.[1] Individuals with diagnosed eye disorders (e.g., refractive errors, cataract, glaucoma, dry eye disease), a history of ocular surgery, or current pregnancy were excluded due to the potential confounding effects on ocular surface physiology. Both quantitative data (e.g., age, usage time, symptom frequency) and qualitative inputs (e.g., ergonomic conditions, self-reported symptom improvement) were gathered. Data were analyzed using SPSS version 26.0. Descriptive statistics were used to summarize variables (mean, SD, frequency, percentages). Associations between categorical variables were tested using Chi-square tests & t-tests and ANOVA were employed for continuous variables. A p value ≤ 0.05 was considered statistically significant.

Results

Out of the 384 participants initially approached, 38 questionnaires were excluded due to incomplete data, leaving a final sample size of 346 participants for analysis. The gender distribution was nearly equal, with 45.4% males (n =157) and 48.6% females (n =168), while 6% (n =21) did not disclose their gender. The age range of participants was 18 to 40 years, with the majority (86.4%, n= 299) falling within the 18–30-year age group.

Overall, 63.5% (n = 220) of the participants reported experiencing at least one symptom of Computer Vision Syndrome (CVS). Among those with symptoms, 65% (n = 143) reported ocular complaints, whereas 35% (n = 76) experienced extra-ocular symptoms. The most common ocular symptoms included eye fatigue (37.8%, n=131), eye

irritation (24.2%, n=84), and a burning sensation (11.0%). Among extra-ocular symptoms, headaches were the most frequently reported (42.7%, n=148), followed by neck or shoulder pain (33.4%, n=116). A chi-square test showed a statistically significant difference in the distribution of ocular and extra-ocular symptoms, favoring ocular symptoms (χ^2 = 19.25, p < 0.001). (Table I)

Analysis of symptom frequency revealed that 49.7% of participants occasionally experienced a burning sensation in the eyes, and 11.8% reported it as a persistent issue. Itchy eyes were occasionally reported by 62.1% and persistently by 25.7%. Tearing was reported occasionally by 43.9% and consistently by 29.8%, while 48.3% of participants experienced eye redness occasionally. Occasional reports of eye pain and dryness were noted by 39.6% and 44.2% of participants, respectively. Headaches were experienced occasionally by 46.2% of respondents, and neck or shoulder pain was commonly marked as a persistent complaint.

Chi-square analysis indicated a significant association between increased screen time and CVS symptom prevalence (χ^2 = 16.83, p = 0.002). Independent samples t-test revealed that symptomatic users had significantly higher mean screen time (6.40 ± 1.50 hours/day) compared to asymptomatic users (4.90 ± 1.20 hours/day), with a mean difference of 1.50 hours (t = 5.03, df = 344, p < 0.001). (Table II)

In terms of brightness settings, 62.1% (n = 215) used medium brightness, 24% (n = 83) preferred bright settings, and 13.9% (n = 48) used dull screens. Although most participants subjectively reported symptom improvement with frequent screen breaks, a one-way ANOVA showed no statistically significant relationship between break frequency and CVS symptom severity (F = 1.91, df = 2,343, p = 0.152) (Table III).

Table I: Distribution of Ocular and Extra-Ocular Symptoms in CVS

Symptom Type	Observed (n)	Expected (n)	Residual
Ocular Symptoms	143	109.5	+33.5
Extra-Ocular Symptoms	76	109.5	−33.5
Total	**219**		
(χ^2 = 19.25, df = 1, p < 0.001)			

Table II: Comparison of Mean Screen Time Between Symptomatic and Asymptomatic Participants

Group	n	Mean ± SD (hours/day)	Mean Difference	95% CI
Symptomatic	220	6.40 ± 1.50		
Asymptomatic	126	4.90 ± 1.20	1.50	0.91 to 2.09
(t = 5.03, df = 344, p < 0.001)				

Table III: Association of Break Frequency with CVS Severity

Break Frequency	n	Mean Severity Score ± SD
Rare	98	3.40 ± 0.60
Occasional	134	3.20 ± 0.50
Frequent	114	2.90 ± 0.70
(F = 1.91, df = 2,343, p = 0.152)		

Discussion

The present study found a prevalence of CVS at 63.5% among digital device users in Muzaffarabad, aligning with similar regional findings in Ghana (71.2%) and Ethiopia (69.5%).[9, 10] Global estimates range from 42.2% to 89.9%, with variability likely attributable to methodological heterogeneity including case definitions, sampling strategies, population demographics, and symptom assessment tools.[11] Our sample predominantly consisted of young adults aged 18–30 years (86.4%), a group recognized for higher CVS risk due to prolonged screen exposure related to education, work, and social media use.[12] While some international studies[13] report higher CVS prevalence in females, our analysis found no statistically significant gender association. This discrepancy may reflect differing screen time behaviors, reporting accuracy, or sociocultural roles influencing device use.

Ocular symptoms were commonly reported, with eye fatigue (37.8%) and irritation (24.2%) leading complaints—consistent with findings from previous studies[14] and supported by broader research into symptom drivers such as sustained accommodative effort, reduced blink rate, and tear film instability during prolonged screen exposure.[1 5] Extra-ocular symptoms such as headache (42.7%) and neck/shoulder discomfort (33.4%) were also prevalent, corroborating previous studies from Saudi Arabia and West Africa.[10,12] These symptoms reflect the ergonomic strain of suboptimal workstation

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setups and prolonged static posture. While we observed subjective symptom relief with increased screen breaks, statistical analysis did not establish a significant association between break frequency and symptom severity, suggesting that break timing, quality, and ergonomic context may be important confounders.[11]

Screen brightness was evaluated as a modifiable ergonomic factor. A majority (62.1%) of participants reported using medium brightness levels, aligning with best-practice ergonomic guidelines. Previous research suggested that screen brightness adjustment is among the most frequently adopted personal interventions to manage CVS symptoms. [13] Our study's granular reporting of symptom frequency (e.g., occasional vs. persistent) provides a valuable contribution to CVS literature. Notably, symptoms such as burning (49.7%), itching (62.1%), and tearing (43.9%) were frequently reported as occasional, reflecting a chronic but fluctuating symptom pattern. However, neck pain was disproportionately reported as a persistent issue, suggesting ergonomic strain beyond transient visual discomfort [10,12]

Our findings regarding the symptomatology and prevalence of CVS in our study population are largely congruent with existing regional and international literature. However, the precise relationship between the severity of CVS symptoms and mitigating behaviors, such as the frequency of visual breaks, remains to be definitively established. [11] This highlights the ongoing need for more rigorous investigations employing objective assessments of visual performance, detailed ergonomic parameters, and analysis of blink dynamics to fully elucidate this complex interaction.

This study is subject to several limitations inherent to its design. Primarily, the reliance on self-reported data introduces the potential for recall bias and potential misclassification of both symptom frequency and behavioral practices. Furthermore, the absence of a control group and the lack of objective ophthalmologic evaluations conducted within the study design preclude the establishment of strong causal inferences regarding the observed associations. To enhance reproducibility and facilitate more robust comparisons across studies, future research endeavors should ideally incorporate clinical diagnostic criteria for CVS, utilize stratified sampling techniques to ensure representativeness, and employ standardized, validated assessment tools.

Despite these limitations, this study possesses notable strengths that contribute valuable insights to the field. It represents the inaugural documented assessment of CVS prevalence and symptom patterns specifically within Muzaffarabad, Azad Jammu and Kashmir, a region that has previously lacked dedicated epidemiological data concerning digital eye strain. The relatively substantial sample size enhances the statistical power and generalizability of our findings within this population. Moreover, the use of a structured questionnaire adapted from validated instruments strengthens the internal validity of our results and facilitates meaningful comparisons with regional and global datasets on CVS. The detailed categorization of symptom frequency into occasional and persistent categories provides a more granular understanding of CVS symptomatology than studies that solely report binary prevalence, offering a nuanced view often underreported in the literature. By examining ergonomic factors such as screen brightness preference in conjunction with reported symptomatic relief obtained from screen breaks, the study offers multifaceted insights into modifiable behavioral practices that are relevant for both clinical management and public health interventions aimed at reducing digital eye strain. This study is also distinct in providing a comprehensive breakdown of both ocular and extra-ocular CVS symptoms using frequency categories (never, occasional, always), a level of detail often absent in prior regional studies. Unlike investigations that primarily emphasize overall prevalence figures, this study dissects the distribution of specific symptoms, such as persistent neck pain, and explores their correlation with reported ergonomic practices. This detailed profiling of symptoms not only enhances our understanding of patient discomfort but also provides a foundation for developing more tailored ergonomic and behavioral interventions. Furthermore, the study highlights the nuanced but ultimately non-significant relationship observed between break frequency and symptom severity, underscoring the ongoing need for more

detailed prospective ergonomic assessments to fully understand the impact of such behaviors.

Based on the findings of this study, several recommendations are proposed to mitigate the burden of CVS in the region. It is recommended that routine ophthalmic screening programs be implemented, particularly targeting frequent computer users within educational institutions and occupational settings, to facilitate early detection and management of CVS. Awareness campaigns on Computer Vision Syndrome and the principles of ergonomics should be conducted to educate the public about preventive strategies, such as adhering to the 20-20-20 rule and optimizing screen adjustment practices. [15] Employers should be encouraged to promote the establishment of ergonomically designed workstations and support policies that allow for regular visual breaks to reduce ocular and musculoskeletal strain among their employees. Integrating visual hygiene practices into public health and digital literacy programs is also crucial, with a specific focus on educating younger populations who are increasingly exposed to digital screens. [16,17,18] For future research, it is recommended that studies incorporate longitudinal study designs, include appropriate control groups for comparison, and employ objective clinical measures to more accurately evaluate the long-term effects of CVS and assess the efficacy of various ergonomic interventions.

Conclusion

We found a high prevalence (63.5%) of computer vision syndrome among digital device users in Muzaffarabad, with ocular symptoms being more common than extra-ocular ones. Prolonged screen time was significantly associated with symptom severity, while screen breaks alone showed no statistical protective effect. These findings underscore the need for targeted ergonomic interventions and public education on safe screen practices.

Conflict of Interest: The Author's Declare No Conflict of Interest

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Ethics: The study was conducted in adherence to the Helsinki Declaration and human ethics protocols.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon request.