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Article

Prevalence of Computer Vision Syndrome among Allied Health Professionals: A Cross-Sectional Study

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ABSTRACT

Background: Computer Vision Syndrome (CVS) is an increasingly prevalent occupational health condition resulting from prolonged digital screen use and is characterized by visual and musculoskeletal symptoms that can impair work efficiency and well-being. Allied health professionals are particularly vulnerable due to sustained screen-based clinical and administrative tasks, yet local evidence from low- and middle-income settings remains limited. **Objective**: To determine the prevalence of Computer Vision Syndrome among allied health professionals in Lahore and to examine its association with daily screen exposure. **Methods**: A cross-sectional observational study was conducted among 145 allied health professionals working in selected healthcare institutions in Lahore. Data were collected using a structured self-administered questionnaire capturing demographic characteristics, average daily screen time, and CVS-related symptoms. CVS was defined as the presence of one or more visual or musculoskeletal symptoms associated with screen use. Descriptive statistics were used to estimate prevalence, and chi-square tests and multivariable logistic regression were applied to assess associations between screen exposure and CVS. **Results**: The overall prevalence of CVS was 68.3%. Eye strain (61.4%) and headache (55.2%) were the most frequently reported symptoms. Participants with screen exposure exceeding six hours per day had significantly higher odds of CVS compared with those using screens for two to four hours (adjusted OR 6.92; 95% CI 2.41–19.8), demonstrating a clear dose–response relationship. Age and gender were not independently associated with CVS. **Conclusion**: Computer Vision Syndrome is highly prevalent among allied health professionals in Lahore, with prolonged screen exposure emerging as the strongest risk factor. Implementation of ergonomic interventions, promotion of regular visual breaks, and increased occupational health awareness are essential to reduce the burden of CVS in healthcare settings.

Keywords: Computer Vision Syndrome; Allied health professionals; Screen time; Occupational health; Cross-sectional study

INTRODUCTION

Computer Vision Syndrome (CVS) is a well-recognized occupational health condition characterized by a constellation of visual and extra-ocular symptoms that arise from prolonged use of digital display devices, including computers, tablets, and smartphones (1). Common manifestations include eye strain, visual fatigue, blurred vision, dry eyes, headache, and musculoskeletal discomfort involving the neck and shoulders, which collectively impair work efficiency and quality of life (2). With the rapid digitalization of healthcare systems, screen-based tasks have become integral to clinical documentation, diagnostics, reporting, and communication, substantially increasing daily visual demands on healthcare workers (3).

Allied health professionals constitute a population at particular risk of CVS due to the nature of their work, which often involves sustained computer use for imaging analysis, laboratory reporting, electronic medical records, and administrative responsibilities. Unlike intermittent computer use seen in some occupations, allied health professionals may experience prolonged, uninterrupted screen exposure under time pressure, suboptimal ergonomic conditions, and limited awareness of preventive practices, all of which contribute to visual and postural strain (4). Previous studies conducted among healthcare workers and office-based professionals have reported CVS prevalence ranging from 60% to 90%, with screen exposure duration, poor workstation ergonomics, and inadequate rest breaks identified as key risk factors (5,6).

Despite growing global recognition of CVS as an occupational health concern, the existing literature shows considerable variability in prevalence estimates across professions and settings, reflecting differences in work patterns, assessment tools, and preventive

awareness (7). Importantly, most available studies have focused on office workers, students, or physicians, with comparatively fewer investigations targeting allied health professionals as a distinct group, particularly in low- and middle-income countries (8). In Pakistan, where healthcare facilities often operate under resource constraints and ergonomic standards may be inconsistently implemented, allied health professionals may face an elevated yet under-documented burden of CVS.

Lahore, as a major urban healthcare hub, hosts a large workforce of allied health professionals across public and private institutions, many of whom rely extensively on digital technologies in their daily practice. However, local evidence regarding the prevalence and symptom profile of CVS in this population remains scarce, limiting the ability of occupational health planners and hospital administrators to design targeted preventive strategies. Addressing this knowledge gap is essential for informing workplace interventions, promoting visual health, and reducing productivity loss related to CVS (9).

Therefore, the objective of this study was to determine the prevalence of Computer Vision Syndrome among allied health professionals working in Lahore and to describe the distribution of CVS-related symptoms in relation to screen exposure patterns using a cross-sectional study design (10).

MATERIALS AND METHODS

A cross-sectional observational study was conducted in Lahore, Pakistan, across selected public and private healthcare institutions employing allied health professionals, with data collected over a three-month period. This design was chosen to estimate the prevalence of Computer Vision Syndrome (CVS) and describe associated symptom patterns within a defined occupational group at a single point in time, consistent with established methodological guidance for prevalence studies in occupational health research (11). Recruitment was carried out during routine working hours through on-site coordination with departmental supervisors, and participation was voluntary. Prior to enrollment, all eligible individuals received a standardized explanation of the study objectives, procedures, and confidentiality measures, and written informed consent was obtained.

The study population comprised allied health professionals aged 20 years and above, including physiotherapists, radiology technologists, medical laboratory technologists, and other allied health staff, who reported routine use of digital display devices for occupational purposes for at least two hours per working day. Individuals with a prior diagnosis of chronic ocular disease unrelated to screen use, those with a history of ocular surgery within the preceding six months, or those unwilling to participate were excluded to minimize outcome misclassification. Participants were selected using a non-probability convenience sampling approach, reflecting feasibility constraints in busy clinical environments; to reduce selection bias, recruitment was conducted across multiple departments and institutions, and data collection was spread across different work shifts.

Data were collected using a structured, self-administered questionnaire developed based on commonly used CVS assessment instruments and symptom definitions reported in the literature (12,13). The questionnaire captured demographic characteristics (age, gender, professional cadre), occupational screen exposure (average daily screen time in hours), and the presence of CVS-related symptoms, including eye strain, headache, blurred vision, dry eyes, and neck or shoulder pain, experienced during or after computer use. Computer Vision Syndrome was operationally defined as the self-reported presence of one or more visual or musculoskeletal symptoms temporally associated with screen use during the preceding month, an approach widely applied in occupational CVS research to estimate prevalence (14). Screen exposure was categorized a priori into 2–4 hours, 4–6 hours, and more than 6 hours per day to facilitate dose–response assessment.

Several steps were undertaken to enhance data quality and reduce information bias. Participants completed the questionnaire anonymously to limit social desirability bias, and clear written instructions were provided to ensure consistent interpretation of symptom items. Data collectors were available to clarify questions without suggesting responses. Potential confounding by demographic factors was addressed analytically by including age and gender as covariates in multivariable analyses, based on prior evidence of their association with CVS risk (15).

The sample size was set at 145 participants to estimate the prevalence of CVS with acceptable precision, using a conservative anticipated prevalence of 70%, a 95% confidence level, and an absolute precision of approximately 7%, while accounting for feasible recruitment within the study period. Data were entered into a password-protected database and cross-checked for accuracy. Descriptive statistics were used to summarize participant characteristics and symptom frequencies. Associations between CVS prevalence and screen exposure categories, as well as gender, were examined using chi-square tests, and the strength of associations was quantified using odds ratios with 95% confidence intervals. All statistical analyses were performed using SPSS (IBM Corp., Armonk, NY), with statistical significance set at a two-sided p-value of <0.05.

Ethical approval for the study was obtained from the relevant institutional ethics review committee in Lahore, and all procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki for research involving human participants (16). Data integrity and reproducibility were supported through the use of a predefined codebook, standardized variable definitions, and secure storage of anonymized study data accessible only to the research team.

RESULTS

A total of 145 allied health professionals participated in the study. More than half of the participants were male (56.6%), and the largest proportion belonged to the 25–34 years age group (49.7%), followed by those aged 20–24 years (26.2%). Physiotherapists constituted the largest professional cadre (31.7%), followed by medical laboratory technologists (29.0%) and radiology technologists (26.9%), indicating broad representation across allied health disciplines (Table 1).

Assessment of occupational screen exposure revealed that a majority of participants (57.9%) reported using digital screens for more than six hours per day, while 28.3% reported screen use of four to six hours daily. Only a small proportion (13.8%) reported screen exposure limited to two to four hours per day, highlighting a high level of prolonged digital device use in this population (Table 2).

The overall prevalence of Computer Vision Syndrome was 68.3%, with 99 participants reporting at least one CVS-related symptom associated with screen use. Among symptomatic individuals, eye strain was the most frequently reported complaint (61.4%), followed by headache (55.2%), blurred vision (48.3%), neck or shoulder pain (46.9%), and dry eyes (44.8%). These findings indicate that both visual and musculoskeletal symptoms were commonly experienced by allied health professionals (Tables 3 and 4).

A strong, statistically significant association was observed between daily screen exposure and the presence of CVS. Participants reporting screen use of four to six hours per day had more than four times higher odds of CVS compared with those using screens for two to four hours (OR 4.24; 95% CI 1.32–13.6; p=0.015). This association was markedly stronger among individuals with screen exposure exceeding six hours per day, who demonstrated a fifteen-fold increase in the odds of CVS (OR 15.00; 95% CI 4.75–47.3; p<0.001) (Table 5).

Gender-based comparison showed a higher prevalence of CVS among males (73.2%) compared with females (61.9%); however, this difference did not reach statistical significance (OR 1.68; 95% CI 0.82–3.45; p=0.151) (Table 6). Multivariable logistic regression analysis confirmed prolonged screen exposure as the strongest independent predictor of CVS. After adjustment for age and gender, participants with screen exposure exceeding six hours per day had nearly seven times higher odds of CVS (adjusted OR 6.92; 95% CI 2.41–19.8; p<0.001), while those with four to six hours of exposure had almost three times higher odds (adjusted OR 2.87; 95% CI 1.01–8.14; p=0.047). Age and gender were not independently associated with CVS in the adjusted model (Table 7).

Table 1. Socio-Demographic Characteristics of Allied Health Professionals (n = 145)

Variable	Category	n (%)
Gender	Male	82 (56.6)
	Female	63 (43.4)
Age group (years)	20–24	38 (26.2)
	25–34	72 (49.7)
	35–44	25 (17.2)
	≥45	10 (6.9)
Professional cadre	Physiotherapy	46 (31.7)
	Radiology technology	39 (26.9)
	Medical laboratory technology	42 (29.0)
	Other allied health	18 (12.4)

Table 2. Daily Screen Exposure among Participants (n = 145)

Daily screen time	n (%)
2–4 hours/day	20 (13.8)
4–6 hours/day	41 (28.3)
>6 hours/day	84 (57.9)

Table 3. Prevalence of Computer Vision Syndrome (CVS) (n = 145)

CVS status	n (%)
CVS present	99 (68.3)
CVS absent	46 (31.7)

Table 4. Frequency of Computer Vision Syndrome–Related Symptoms (n = 145)

Symptom	n (%)
Eye strain	89 (61.4)
Headache	80 (55.2)
Blurred vision	70 (48.3)
Neck/shoulder pain	68 (46.9)
Dry eyes	65 (44.8)

Table 5. Association between Daily Screen Time and Computer Vision Syndrome

Screen time	CVS present n (%)	CVS absent n (%)	Odds Ratio (95% CI)	p-value
2–4 hours/day	5 (25.0)	15 (75.0)	Reference	—
4–6 hours/day	24 (58.5)	17 (41.5)	4.24 (1.32–13.6)	0.015
>6 hours/day	70 (83.3)	14 (16.7)	15.00 (4.75–47.3)	<0.001

Table 6. Association between Gender and Computer Vision Syndrome

Gender	CVS present n (%)	CVS absent n (%)	Odds Ratio (95% CI)	p-value
Male	60 (73.2)	22 (26.8)	1.68 (0.82–3.45)	0.151
Female	39 (61.9)	24 (38.1)	Reference	—

Table 7. Multivariable Logistic Regression Analysis: Predictors of CVS (n = 145)

Predictor	Adjusted OR	95% CI	p-value
Screen time >6 hours/day	6.92	2.41–19.8	<0.001
Screen time 4–6 hours/day	2.87	1.01–8.14	0.047
Male gender	1.42	0.69–2.92	0.336
Age (per 10-year increase)	1.09	0.81–1.47	0.571

DISCUSSION

This study demonstrates a high prevalence of Computer Vision Syndrome among allied health professionals in Lahore, with more than two-thirds of participants reporting at least one CVS-related symptom. This finding aligns with growing global evidence indicating that CVS is a common occupational health problem among healthcare workers who engage in prolonged digital screen use (17,18). The observed prevalence is comparable to reports from similar professional groups in Asia and the Middle East, where prevalence estimates commonly range between 60% and 80%, reflecting widespread exposure to screen-based tasks in modern healthcare environments (19).

Eye strain and headache emerged as the most frequently reported symptoms, followed by blurred vision and musculoskeletal discomfort involving the neck and shoulders. These symptom patterns are consistent with the established pathophysiology of CVS, which involves sustained accommodative effort, reduced blink rate, ocular surface dryness, and prolonged static postures during screen use (20). The coexistence of visual and musculoskeletal symptoms observed in this study underscores the multifactorial nature of CVS and highlights the interaction between visual ergonomics and overall workstation design.

A strong dose–response relationship was identified between daily screen exposure and the presence of CVS. Participants with screen exposure exceeding six hours per day exhibited markedly higher odds of CVS compared with those with shorter exposure durations, even after adjustment for age and gender. This finding is consistent with previous studies demonstrating that prolonged uninterrupted screen time is one of the most robust predictors of CVS across occupational settings (21,22). Extended screen exposure increases visual demand and postural strain while limiting opportunities for ocular rest, thereby amplifying symptom severity and frequency.

Gender was not independently associated with CVS in the adjusted analysis, suggesting that occupational exposure patterns rather than biological differences may be the primary drivers of CVS risk in this population. Similar findings have been reported in studies where both male and female healthcare workers experienced comparable CVS prevalence when screen exposure and work characteristics were similar (23). This emphasizes the importance of addressing workplace factors rather than focusing solely on individual characteristics when designing preventive strategies.

From an occupational health perspective, the high prevalence of CVS among allied health professionals is particularly concerning, as these professionals play a critical role in healthcare delivery and often work under demanding conditions. CVS has been associated with reduced work efficiency, increased error rates, and decreased job satisfaction, which may indirectly affect patient care quality (24). In resource-constrained healthcare settings such as those commonly encountered in Pakistan, limited awareness of ergonomic principles and lack of structured occupational health programs may further exacerbate the burden of CVS.

The findings of this study have important practical implications. Interventions such as ergonomic workstation adjustments, optimization of screen height and viewing distance, appropriate lighting, and promotion of regular visual breaks—such as the 20-20-20 rule—have been shown to reduce CVS symptoms effectively (25). Incorporating ergonomic training and visual health awareness into workplace policies for allied health professionals may represent a low-cost, high-impact strategy to mitigate CVS-related morbidity.

Several limitations should be considered when interpreting these results. The cross-sectional design precludes causal inference, and reliance on self-reported symptoms may introduce recall bias. Additionally, convenience sampling may limit generalizability beyond the study population. Despite these limitations, the study provides valuable local evidence on CVS among allied health professionals in Lahore and addresses a notable gap in occupational health research within this context.

Overall, the findings highlight Computer Vision Syndrome as a prevalent and under-recognized occupational health issue among allied health professionals. Addressing modifiable workplace and behavioral risk factors is essential to protect visual health, enhance productivity, and support sustainable healthcare workforce performance (26).

CONCLUSION

This study concludes that Computer Vision Syndrome is highly prevalent among allied health professionals in Lahore, with more than two-thirds of participants experiencing CVS-related symptoms. Prolonged daily screen exposure emerged as the strongest determinant of CVS, demonstrating a clear dose–response relationship independent of age and gender. Visual symptoms such as eye strain and headache, along with associated musculoskeletal discomfort, were commonly reported, indicating the combined impact of visual and ergonomic stressors in the workplace. These findings highlight the need for targeted occupational health interventions focusing on ergonomic workstation design, regular visual breaks, and increased awareness of preventive strategies among allied health professionals. Integrating visual health promotion and ergonomic training into institutional policies may help reduce the burden of CVS, improve workforce well-being, and enhance productivity in healthcare settings.

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