Impact of Gender on the Incidence and Symptoms of Computer Vision Syndrome in University Students: A Cross-Sectional Study in Pakistan.

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ABSTRACT

Purpose: To determine the difference in severity and symptomatology of CVS between male and female students by reviewing the scores obtained from the questionnaire. Moreover, to find the prevalence of Computer Vision Syndrome among undergraduate university students in Lahore.

Methodology: This was a Cross-sectional analytical study. The estimated sample size was 420 subjects. Students having digital devices like smartphones, tablets, laptops, desktop computers, and a habit of using either of these digital devices for ≥2 hours daily for educational and social networking. Moreover, they were willing to provide informed consent and fill out the questionnaire.

Result: A total of 420 students responded (mean age: 22.75 ± 0.84 years), two-thirds (66.7%) of whom were female. Over 94% of female students reported the severity of symptoms of computer vision syndrome. A statistically significant gender difference was observed in symptoms of eye tiredness due to VDT use, with females reporting it more frequently (67.8%) compared to males (57.2%) ($p = 0.008$). A shorter TBUT (<5 seconds) was observed in 5.3% of males and 16.0% of females, indicating a higher incidence of tear film instability in females.

Conclusion: Ocular symptoms, such as itchy eyes, were more common among females. Other symptoms, such as redness, burning, and foreign body sensation, were common in both genders; no statistically significant differences were observed.

Keywords: Health, Vision, Screen

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INTRODUCTION

Worldwide, the academic and social habits of university students have changed as a result of the persistent use of digital devices, including smartphones, laptops, tablets, and personal computers. Moreover, it has played a key role in the notable increase in vision-related problems, which is referred to as Computer Vision Syndrome (CVS). It is described as a collection of ocular, musculoskeletal, and visual symptoms brought on by prolonged screen time. These symptoms usually include eye strain, headaches, burning sensations, impaired vision, shoulder or neck pain, dryness, and redness in the eyes. , Ocular surface variability and visual discomfort are caused by a several reasons, including intense light from digital screens, poor ergonomics, lowered blink rate, intense light from digital screens, lowered blink rate, and excessive accommodative effort brought on by extended screen time. Depending on the study population, diagnostic standards, and length of screen time, prevalence rates among college students have been estimated to vary from 60% to 90%, indicating the substantial global impact of CVS. , Lack of ergonomic awareness, restricted access to preventive interventions, and extended online learning schedules during and after the COVID-19 pandemic may make the issue worse in developing nations like Pakistan, where educational practices have increasingly shifted towards digital learning platforms,

It has been determined that gender may be a risk factor that affects the frequency and intensity of CVS symptoms. According to several studies, female students are more likely than male students to have CVS. , The most likely explanations include lower blink rates, hormonal effects on the ocular surface, and behavioral aspects, including multitasking and extended smartphone use among females. Furthermore, in low- and middle-income nations, sociocultural factors like lifestyle choices, academic workload, and a lack of access to healthcare facilities may exacerbate this disparity. Nonetheless, there have been a few reports from the local population regarding gender-specific variations in CVS among Pakistani university students. The majority of Southeast Asian research that is currently accessible concentrates on prevalence in the general population. Variations based on gender were not covered. The concept of gender-based preventive initiatives, such as lowering screen time, focused awareness campaigns, ergonomic practices, and gender-friendly institutional reforms in institutions, is vital to comprehending this gap.

Thus, the purpose of this study was to evaluate how gender affected the frequency and intensity of CVS symptoms among Pakistani university students in Lahore. The results were expected to contribute to evidence-based solutions for lowering the burden of CVS in students by offering useful information to ophthalmologists, the public, and legislators.

METHODOLOGY

This comparative cross-sectional study was conducted at the College of Medicine and Dentistry, Fatima Memorial Hospital (FMH), Lahore, Pakistan, from January - September 2025. Ethical approval was obtained from the Institutional Review Board (IRB) of FMH College of Medicine and Dentistry. The study population consisted of undergraduate students ranging from first year to final year, enrolled in medical, dental, and allied health sciences programs. Sample size was determined using a 95% confidence level, a level of precision of 5%, and the prevalence of CVS among students, 94% and 72.4% reported in a study, was used. The Computer Vision Syndrome Questionnaire, which is a validated and reliable tool for diagnosing and grading CVS in population-based studies, was used in the current study. The questionnaire was modified to include three sections: (i) demographic details, (ii) screen-time behaviors including average daily screen exposure, type of devices used, and whether used for educational and social networking or both; and (iii) CVS-related symptoms such as blurred vision, eye strain, dryness, burning, itching, and headache.

A non-probability purposive sampling technique was used. Data were entered into SPSS version 25

for statistical analysis. Descriptive statistics, including mean ± SD, frequencies, and percentages, were computed for demographic and clinical variables. The chi-square test was used to examine gender differences in CVS prevalence, and the Mann-Whitney U test was applied to compare the ocular parameters with gender. $P \leq 0.05$ was considered statistically significant.

RESULTS

In this study, it was revealed that itchy eyes were found to be statistically significantly ($p<0.05$) and it was more prevalent among females (71.8%) as compared to males (61.7%). Other ocular complaints, like burning sensation, foreign body sensation, and redness of eyes, were reported by both genders, but there was no statistically significant difference ($p > 0.05$). Disturbed routine life activities were observed in 146(72.6%) males and 269(83.3%) females, where p=0.088. which is not statistically significant. These findings suggested that while most ocular symptoms were common across genders, females are more likely to experience itching and a higher impact on daily functioning, as shown in Table 1.

Table No. 1: Ocular Symptoms by Gender

Symptom	Male (n=201)	Female (n=323)	χ^2	p-value
Itchy Eyes	124 (61.7%)	232 (71.8%)	10.81	0.029
Redness	136 (67.6%)	209 (64.7%)	2.467	0.651
Burning Sensation	133 (66.2%)	207 (64.1%)	1.78	0.879
Foreign Body Sensation	134 (66.7%)	203 (62.8%)	3.079	0.545
Daily Life Disturbance	146 (72.6%)	269 (83.3%)	8.093	0.088

The results indicate that digital device usage was prevalent among both genders, with 94.1% of females and 91.5% of males reporting regular use of digital devices. Leisure screen time was reported among 58.2% of males and 64.7% of females. Daily hours of use of digital devices were observed between 70.1% of males and 71.5% of females. but no statistically significant difference was observed. A statistically significant gender difference was observed in symptoms of eye tiredness due to VDT use, which was more common in females 67.8% compared to males 57.2%, p=0.008), Table 2.

Table No. 2: Usage of Digital Devices by Gender

Variable	Male (n=201)	Female (n=323)	χ^2	p-value
VDT Usage (computer/ tablet/phone)	182 (91.54%)	304 (94.12%)	5.874	0.118
Leisure Screen Time	117 (58.2%)	209 (64.7%)	5.331	0.255
Daily Hours of Use	141 (70.1%)	231 (71.5%)	5.751	0.219
Eyes Tired by VDT	115 (57.2%)	219 (67.8%)	13.92	0.008*

*shows significant p-values

CIC scores were significantly higher in females as compared to males ($p = 0.004$), indicating more conjunctival involvement among females. In contrast, tear breakup time was significantly longer in males (mean rank = 281.91) than in females (mean rank = 250.42), with the difference being statistically significant ($p = 0.020$). No significant difference was seen in Schirmer's test values between genders ($p = 0.891$). Though GCD was significantly higher in males (mean rank = 285.42) as compared to females (mean rank = 247.50) ($p = 0.005$), as shown in Table 3.

Table No. 3: Comparison of clinical parameters between university students

Parameter	Male (n=163) Mean Rank	Female (n=263) Mean Rank	Mann–Whitney U	p-value
TBUT (seconds)	281.91	250.42	28561	0.020*
Schirmer (mm)	261.36	263.21	32232	0.891
Goblet Cell Density (GCD)	285.42	247.5	27616	0.005*
CIC Score	239.9	276.56	27919	0.004*

Visual acuity (6/6) was normal among most students. The proportion of normal VA was higher in females (58.2%) than in males (37.6%). Mild reductions in vision (6/9 or 6/12) were observed in a small number of students, slightly more common among females, as shown in Figure 1.

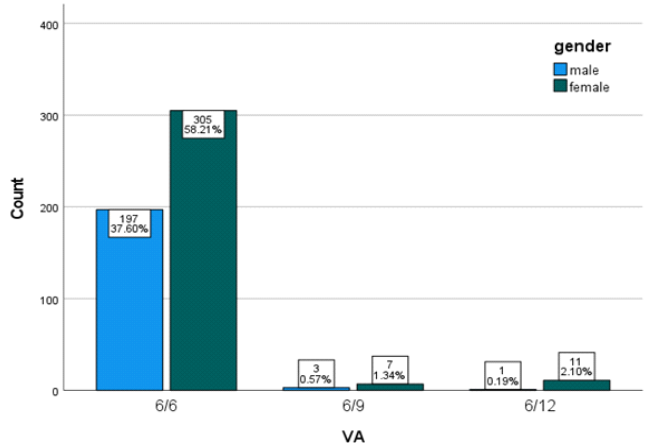

Figure No. 1: Distribution of Visual Acuity by Gender among University Students

In both genders, a shorter TBUT (<5 seconds) was observed (5.3%) in males and (16.0%) in females, which shows the higher incidence of tear film instability in females. The tear breakup time within 5–10 seconds was observed in 21.9% males and 28.8% in females. A TBUT of ≥10 seconds was found in 11.1% of males and 16.8% of females, suggesting relatively stable tear film in this subgroup. Overall, the graph highlighted that females were more likely to present with both shorter (<5 sec) and longer (≥10 sec) TBUT compared to males, whereas a larger proportion of males clustered in the 5–10 seconds range.

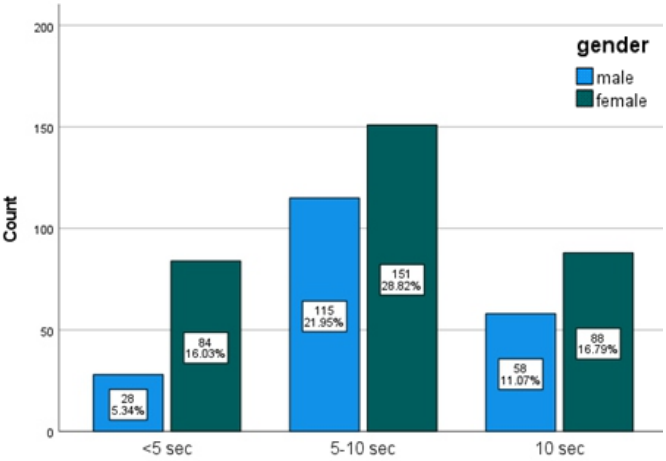

Figure No. 2: Distribution of Tear Break-Up Time by Gender among University Students

Among males, the most frequent category was 2–4 corneal spots (16.8%), followed by 1–2 spots (9.7%) and 4–5 spots (8.2%). In females, corneal spots were more dispersed across categories: 2–4 spots (16.6%) and 4–5 spots (15.8%) were most common, followed by 1–2 spots (15.8%). Higher grades of corneal spots were more frequent in females compared to males, with 5–6 spots reported in 9.7% of females vs. 3.2% of males, and >7 spots observed in 3.6% of females compared to only 0.4% of males.

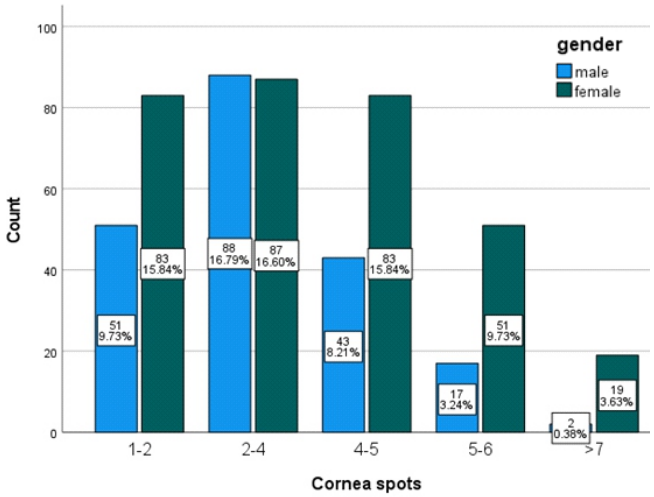

Figure No. 3: Distribution of Corneal Spots by Gender among University Students

Among males, the most frequent category was 2–4 corneal spots (16.8%), followed by 1–2 spots (9.7%) and 4–5 spots (8.2%). In females, corneal spots were more dispersed across categories: 2–4 spots (16.6%) and 4–5 spots (15.8%) were most common, followed by 1–2 spots (15.8%). Higher grades of corneal spots were more common in females as compared to males, with 5–6 spots reported in 9.7% of females vs. 3.2% of males, and >7 spots observed in 3.6% of females compared to only 0.4% of males. Overall, females tended to show a greater frequency of moderate-to-severe corneal spots, whereas males were more concentrated in the lower categories.

DISCUSSION

The present study projected significant gender-related differences in the prevalence and the severity of computer vision syndrome among university students. This finding is supported by previous research, which shows that females are disproportionately affected by ocular symptoms and signs of digital eye strain. The findings of higher rates of itchy eyes, ocular fatigue, and greater daily life disturbance in females in this study were supported by Tauste et al., who demonstrated a higher CVS burden among women due to hormonal influences and ocular surface vulnerability.

The observed reduction in tear breakup time (TBUT) and Higher grades of corneal spots were more frequent in females compared to males, with 5–6 spots reported in 9.7% of females vs. 3.2% of males. These increased values in females further corroborate previous reports linking estrogen-related modulation of tear physiology with higher dry eye prevalence. Abudawood et al., analyzed and reported greater symptoms of CVS among female students of a medical university in Saudi Arabia. Moreover, Al Tawal et al., documented a higher prevalence of CVS in female students in Egypt.

The association between gender and digital device–related tiredness in this study is also in accordance with the systematic review by Coles-Brennan et al., which revealed that females predominantly used smart devices for longer durations and multitasking behaviors. Moreover, a cross-sectional study among university students in Thailand reported that upon adopting safe ergonomic practices and controlled screen time, in female gender was significantly associated with higher CVS prevalence ($p < 0.001$). In addition, Wang L et al., in a cross-sectional study, documented a high CVS prevalence (74.3%) with female sex being a significant predictor of symptom intensity in medical students. Moreover, after controlling for other factors, an Iranian study among university students also identified female gender as a strong predictor of CVS, with an odds ratio of 1.8. All these studies suggested that CVS is a global public health issue among university students. A systematic review projected a high burden of digital eye strain in academic populations, with nearly 70% prevalence in many European countries. In addition, a survey reported that female students had a higher prevalence of CVS with severe symptomatology as compared to their male counterparts.

Overall, these findings support the need for gender-sensitive preventive measures, including targeted awareness campaigns, training, and earlier ophthalmologic evaluation, to alleviate the ocular health burden in digitally active female student populations.

CONCLUSION

In this study, it was concluded that ocular symptoms, such as itchy eyes, were more common among females. Other symptoms, such as redness, burning, and foreign body sensation, were common in both genders; no statistically significant differences were observed. Ocular parameters, goblet cell density, and tear break-up time were slightly higher in males than in females, while in females, greater conjunctival changes and shorter TBUT were observed. Overall, the results suggest that female students are more vulnerable to symptomatic CVS. In contrast, males revealed relatively better ocular surface stability, highlighting the need for targeted preventive strategies in high-risk groups.

Conflict Of Interest: None to declare

Ethical Approval: The study was approved by the Institutional Review Board / Ethical Review Board No. FMH-15//08/2025-IRB-1712 dated September 15, 2025, FMH College of Medicine & Dentistry, Lahore.

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