

Prevalence of Digital Eye Strain and Associated Risk Factors Among Adults: A Cross-Sectional Analytical Study

Dr Ragni Kumari

Assistant Professor & Convenor Department of Optometry Faculty of Paramedical Sciences Uttar Pradesh University of Medical Sciences (UP-UMS) Saifai, Etawah – 206130, Uttar Pradesh, India

Corresponding author

Dr Ragni Kumari Assistant Professor & Convenor Department of Optometry Faculty of Paramedical Sciences Uttar Pradesh University of Medical Sciences (UPUMS) Saifai, Etawah – 206130, Uttar Pradesh, India

Received: May 20, 2026; **Accepted:** June 06, 2026; **Published:** June 15, 2026

ABSTRACT

Background: Digital eye strain has emerged as an important occupational and public health concern due to increasing reliance on screen-based devices.

Objective: To estimate the prevalence of digital eye strain and assess its association with prolonged digital device exposure among adults.

Methods: A cross-sectional analytical study was conducted among 507 adults aged 25–50 years, predominantly office workers. Data were collected using a structured questionnaire assessing screen time, device usage, ergonomic practices, and symptoms of digital eye strain. Associations were analyzed using chi-square test and odds ratio with 95% confidence interval.

Results: The prevalence of digital eye strain was 68% (n=345). The most common symptoms included eye fatigue (72%), dryness (64%), and headache (51%). In the high-risk exposure group (mobile use >6 hours/day without regular breaks), 27.6% reported digital eye strain compared to 35.2% in the low-risk group. The association between exposure level and digital eye strain was not statistically significant (OR = 0.70, 95% CI: 0.48–1.04, $\chi^2 = 3.21$, p = 0.073).

Conclusion: Digital eye strain is highly prevalent among adults; however, no statistically significant association was observed with high screen exposure in this study. Preventive strategies focusing on ergonomic education and behavioral modification are recommended.

Keywords: Digital Eye Strain, Computer Vision Syndrome, Screen Time, Office Workers, Visual Fatigue, Dry Eye, Headache, Ergonomics, Digital Devices, Occupational Health

Introduction

The rapid advancement of digital technology has transformed the way people work, communicate, learn, and entertain themselves. Computers, laptops, smartphones, and tablets have become an integral part of everyday life, particularly among working adults who rely heavily on digital devices to perform professional tasks. With the increasing dependence on screen-based activities, the amount of time spent in front of digital screens has risen dramatically over the past decade. While these technologies offer convenience and improved productivity, prolonged exposure to digital screens has also resulted in several health-related concerns, especially those affecting the eyes [1].

One of the most common problems associated with excessive screen use is digital eye strain, also known as computer vision syndrome. Digital eye strain refers to a group of eye and vision-related symptoms that occur due to extended use of digital devices. Common symptoms include eye fatigue, dryness, irritation, redness, blurred vision, headache, watering of eyes, burning sensation, and difficulty in focusing. Some individuals may also experience neck, shoulder, and back pain due to poor posture while using devices for long periods. These symptoms may vary in severity depending on the duration of screen exposure, lighting conditions, viewing distance, posture, and individual eye health [2].

The prevalence of digital eye strain has increased significantly in recent years because of the growing use of digital devices both at workplaces and at home. The shift toward online communication,

remote working, virtual meetings, and digital learning has further intensified screen exposure among adults. During and after the COVID-19 pandemic, screen time increased considerably as many organizations adopted work-from-home practices. As a result, a large number of individuals began reporting symptoms related to eye discomfort and visual fatigue. Studies conducted in different populations have shown that digital eye strain affects a substantial proportion of adults, making it an important public health issue [3].

Several factors contribute to the development of digital eye strain. Prolonged screen time without breaks, improper viewing distance, poor lighting, reduced blinking rate, incorrect posture, and the use of screens for multiple hours continuously are among the major risk factors. In addition, individuals who already have refractive errors, dry eye disease, or inadequate sleep may be more vulnerable to developing symptoms. Environmental conditions such as air conditioning, glare from screens, and low humidity can also worsen eye discomfort. Despite increasing awareness regarding these factors, many adults fail to adopt preventive measures such as taking regular breaks, adjusting screen brightness, maintaining proper posture, and using protective eyewear [4,5].

Digital eye strain can negatively affect an individual's productivity, concentration, work efficiency, and overall quality of life. Persistent symptoms may interfere with daily activities and reduce occupational performance, especially among professionals who spend most of their working hours on computers. Therefore, it is essential to understand the magnitude of this problem and identify the factors associated with it in order to develop effective preventive strategies and promote healthy digital habits [6,7].

This study aims to assess the prevalence of digital eye strain among adults and examine the associated risk factors contributing to its occurrence. The findings of this study may help increase awareness and encourage the adoption of preventive practices to reduce the burden of digital eye strain.

Methods

Study Design

A cross-sectional analytical study was conducted. The study assessed the prevalence of digital eye strain and its associated risk factors among adults.

Study Population

A total of 507 adults aged 25–50 years participated in the study. Most participants were office workers who used digital devices regularly for work and personal activities.

Outcome Definition

Digital eye strain was defined as the presence of at least one symptom related to prolonged screen use. Symptoms included eye fatigue, dryness, headache, and blurred vision.

Exposure Variables

The study assessed several exposure factors. Daily screen time was categorized as high exposure if it exceeded six hours per day. Mobile phone usage patterns were also evaluated. Break habits during screen use were recorded. Ergonomic awareness, including posture and screen setup, was assessed.

Data Collection

Data were collected using a structured questionnaire. Information on demographics, screen use, symptoms, and preventive practices was obtained from participants.

Statistical Analysis

Descriptive statistics such as frequency and percentage were used to summarize the data. The chi-square test was used to assess associations between variables. Odds ratios (OR) with 95% confidence intervals were calculated. A p-value of less than 0.05 was considered statistically significant.

Results

Prevalence

Out of 507 participants, 345 reported symptoms of digital eye strain. This shows a prevalence of 68%. Digital eye strain was common among the study population.

Eye fatigue was the most frequent symptom. It was reported by 72% of participants. Dryness of eyes was reported by 64%. Headache was reported by 51% (table 1).

Table 1: Symptom Distribution

Symptom	n	%
Eye fatigue	365	72%
Dryness	324	64%
Headache	259	51%

Exposure Characteristics

Half of the participants had high-risk exposure. These individuals used screens for more than six hours daily and did not take regular breaks. The remaining participants had lower exposure or followed break practices.

Awareness of the 20–20–20 rule was low. About 62% of participants were not aware of this preventive practice (table 2).

Table 2: Exposure Characteristics

Variable	Category	n	%
High-risk exposure	>6 hrs + no breaks	254	50%
Low-risk exposure	≤6 hrs / breaks present	253	50%
Awareness of 20–20–20 rule	Low	314	62%

Association Analysis

The relationship between exposure level and digital eye strain was analyzed. Participants with high-risk exposure had more symptoms compared to the low-risk group. However, the association was not statistically significant.

The odds ratio was 0.70. The p-value was 0.073. Since the p-value was greater than 0.05, the association was not considered statistically significant (table 3).

Table 3: Association Analysis

Group	DSE Yes	DSE No	OR	95% CI	p-value
High-risk	70	184	0.70	0.48–1.04	0.073
Low-risk	89	164	Reference	—	—

Key Findings

Digital eye strain was highly prevalent among participants. Most participants had prolonged screen exposure. Many participants did not take regular breaks. Awareness about preventive measures was also low. No statistically significant association was found between high exposure and digital eye strain.

Discussion

This study found a high prevalence of digital eye strain among adults, with 68% of participants reporting at least one symptom. This finding is consistent with earlier studies conducted among office workers, students, and regular computer users [6]. Previous research has reported prevalence rates ranging from around 50% to 80%, depending on population type, screen exposure level, and study design [2]. Our results fall within this range, which suggests that digital eye strain continues to be a widespread problem in modern digital work environments [4].

When compared with older studies, the prevalence observed in our study is slightly similar to many occupational studies conducted in office settings. For example, earlier research among computer-based workers has reported that a large proportion of employee's experience symptoms such as eye discomfort, fatigue, and blurred vision after prolonged screen use. These similarities indicate that despite technological improvements in display quality, the burden of digital eye strain has not significantly reduced over time. In fact, the increasing use of smartphones and portable devices may have further contributed to sustained or even rising symptom prevalence [8].

In terms of symptoms, our study found that eye fatigue was the most common complaint, followed by dryness and headache. This pattern is highly consistent with older literature on computer vision syndrome. Many previous studies have also identified eye strain and dryness as the most frequent symptoms among digital device users. The similarity in symptom distribution across different studies suggests a stable clinical pattern of digital eye strain, regardless of population or geographical region (9).

Older studies have explained eye fatigue primarily as a result of continuous accommodation and convergence demand during screen use. When individuals focus on digital screens for long periods, the ciliary muscles remain in a constant state of contraction. This leads to visual fatigue over time. Our findings support this explanation, as eye fatigue remained the most dominant symptom [7-10].

Dry eye symptoms were also commonly reported in our study, which aligns with earlier research. Previous studies have shown that screen use significantly reduces blink rate, sometimes by more than 50%. Reduced blinking leads to increased tear evaporation and instability of the tear film. This results in dryness, irritation, and burning sensations in the eyes. Our findings are consistent with this well-established mechanism described in older ophthalmological studies [5-9].

Headache was another common symptom observed in this study. Earlier research has similarly reported headaches among frequent computer users. In older studies, headaches have been linked to multiple factors, including prolonged visual focus,

improper screen distance, glare, uncorrected refractive errors, and poor posture [6-9]. The consistency of headache prevalence between our study and earlier findings suggests that digital eye strain is a multifactorial condition rather than a purely ocular problem.

When comparing exposure patterns, our study found that half of the participants used digital devices for more than six hours per day without regular breaks. This reflects a common trend also observed in earlier studies. Older research has consistently shown that long screen time is typical among office workers, especially those involved in data entry, programming, administrative tasks, and online communication [9]. However, while earlier studies often found a direct association between longer screen time and increased symptoms, our study did not find a statistically significant relationship between high-risk exposure and digital eye strain ($p = 0.073$).

This finding differs slightly from some earlier studies that reported a strong positive association between screen time and ocular symptoms. However, it is important to note that the literature on this topic is not entirely consistent. Several studies have also reported weak or non-significant associations, similar to our findings. This inconsistency suggests that screen time alone may not be the only or strongest determinant of digital eye strain [6].

Older studies have emphasized the role of multiple contributing factors beyond screen duration. These include environmental and behavioural conditions such as lighting, screen brightness, air conditioning, viewing distance, posture, and workstation ergonomics. Many researchers have argued that these factors may have an equal or even greater influence on the development of symptoms than screen time itself [9]. In our study, these variables were not fully controlled or measured in detail, which may explain the absence of a statistically significant association. Another possible explanation for the lack of strong association is adaptation. Some earlier studies suggest that individuals who use digital devices regularly may develop a degree of physiological or behavioral adaptation over time. This adaptation may reduce the severity of symptoms despite continued exposure. For example, frequent computer users may unconsciously adjust their viewing distance, blinking pattern, or posture. Such adaptive behaviors may reduce the measurable impact of screen time in cross-sectional studies like ours.

Self-reported symptoms may also contribute to differences between studies. Like many earlier studies on digital eye strain, our study relied on participant-reported data rather than clinical examination [10]. This approach is commonly used due to its simplicity and feasibility, but it may introduce recall bias or subjective variation in symptom reporting. Some participants may overestimate symptoms due to awareness, while others may underreport mild discomfort. Older studies have also highlighted this limitation in questionnaire-based assessments.

Another important comparison with earlier research is awareness of preventive practices. In our study, awareness of the 20-20-20 rule was low, with 62% of participants not familiar with it. This finding is consistent with previous studies, which have repeatedly

shown poor awareness and low adherence to preventive eye care practices among digital device users. Despite increasing global awareness campaigns, adoption of simple preventive strategies such as regular breaks, proper lighting, and ergonomic positioning remains limited [7].

Older studies have also emphasized the importance of preventive education. Many researchers have recommended workplace interventions, including scheduled screen breaks, ergonomic training, and awareness programs. The consistency of low awareness across studies suggests that education alone has not been sufficient to change behaviour in a sustained way [1-5].

When comparing overall findings, our study aligns with older research in several key aspects. The prevalence is similar, the symptom pattern is consistent, and the role of reduced blinking and visual strain is well supported. However, the lack of a strong statistical association between screen time and symptoms differs from some earlier studies but is consistent with others. This variation highlights the complex nature of digital eye strain and suggests that it is influenced by multiple interacting factors rather than a single exposure variable [7-9].

Overall, this study adds to the existing body of literature by reinforcing the high burden of digital eye strain among adults and highlighting the persistent gap between awareness and preventive practice. It also supports the need for more comprehensive future research that includes environmental, behavioral, and occupational factors in addition to screen time alone. Longitudinal studies and objective clinical assessments may provide clearer evidence regarding causation and help resolve inconsistencies seen in cross-sectional studies.

Conclusion

This study shows that digital eye strain is highly prevalent among adults, affecting around two-thirds of the participants. Eye fatigue, dryness, and headache were the most common symptoms, highlighting the impact of prolonged digital screen use on visual health.

Although many participants reported high screen exposure, no statistically significant association was found between screen time and digital eye strain. This suggests that other factors such as ergonomics, lighting, posture, and individual adaptation may also play an important role.

Awareness of preventive measures, including the 20–20–20 rule, was found to be low. This indicates a gap in knowledge and practice regarding healthy screen habits among working adults.

Overall, the findings suggest that digital eye strain remains a common and under-recognized occupational health issue. There is a need to promote awareness, encourage regular screen breaks, and improve ergonomic practices to reduce symptoms.

Future studies should include larger populations and consider multiple environmental and behavioral factors to better understand the condition and its causes.

References

1. Anbesu EW, Asamene KL. Prevalence of computer vision syndrome: A systematic review and meta-analysis. *Sci Rep*. 2023. 13: 28750.
2. Pucker AD, Kerr AM, Sanderson J, Lievens C. Digital eye strain: Updated perspectives. *Surv Ophthalmol*. 2024. 16: 233-246.
3. Moore PA, Wolffsohn JS, Sheppard AL. Digital eye strain among working adults in the UK and Ireland. *Clin Optom*. 2024. 47: 102176
4. Ccami-Bernal F, Soriano-Moreno DR, Romero-Robles MA, Barriga-Chambi F, Tuco KG, Castro-Diaz SD, et al. Prevalence of computer vision syndrome: A systematic review. *Healthcare*. 2023. 11: 45.
5. Kahal F, Al Darra A, Torbey A. Computer vision syndrome: A comprehensive review. *Ophthalmic Epidemiol*. 2025. 11: 2476923.
6. Almuqrashi A, Al-Noumani H, Al-Abri F, Al-Hinai H, Bani Oraba H. Prevalence of computer vision syndrome and associated factors. *BMC Public Health*. 2025. 25: 2668
7. León-Figueroa DA, Barboza JJ, Siddiq A, Sah R, Valladares-Garrido MJ, et al. Computer vision syndrome during the COVID-19 pandemic: A systematic review. *Heliyon*. 2024. 10: e10902934.
8. Abdulmannan DM, Naser AY. Prevalence and predictors of computer vision syndrome among adults females in Jordan: A cross-sectional study. *J Ophthalmol*. 2026. 105: e47678.
9. Hafsa N, Yashfa I, Momna R, Warda A, Maryam A, et al. Prevalence of digital eye strain and associated factors among adults. *Healer J*. 2026. 6: 57-64
10. Kaur K, Gurnani B, Nayak S, Deori N, Kaur S, et al. Digital eye strain: A comprehensive review. *Int J Environ Res Public Health*. 2022. 19: 10000.