*Original Article*

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# Awareness of Digital Eye Strain and Its Effects on the Ocular Health among Young Individuals

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## ABSTRACT

Background and Objectives: Digital eye strain (DES) has become a growing concern, manifesting through ocular symptoms such as watery eyes, burning sensations, and redness, as well as asthenopic symptoms such as headaches, dry eyes, and blurred vision. Extra-ocular symptoms include neck and back pain. DES remains prevalent among the younger population due to increased screen usage. This study aims to assess the awareness of DES among high school students and its effects on ocular health. To evaluate awareness levels of DES and its effects on the ocular health of young individuals while educating this demographic about the risks associated with prolonged screen use.

METHODOLOGY: An observational, cross-sectional study was conducted over four months, including 152 high school students aged 13 to 20 years. Data were collected using a structured questionnaire, and statistical analysis was performed using SPSS version 21.

RESULTS: The findings revealed that 27 participants (17.8%) reported changes in their social life due to prolonged screen use. Furthermore, difficulties in maintaining focus were common, with 88 students (57.9%) rarely reporting challenges, 37 (24.3%) occasionally, and 23 (15.1%) frequently. Preventive measures were utilized by some participants 33 (21.7%) took breaks, 61 (40.1%) adjusted screen brightness, and 30 (19.7%) employed blue light filters. However, 28 (18.4%) did not engage in any mitigation strategies.

CONCLUSION: Findings indicate limited awareness of DES among students, emphasizing the need for educational interventions and public awareness programs to mitigate its effects. This would encourage proactive habits and informed decision-making to preserve ocular health in a digital age.

KEYWORDS: Digital eye strain, ocular health, awareness, screen time

## INTRODUCTION

The digital revolution has fundamentally transformed how societies interact, learn, and work. Beginning in the 1980s, technological advancements paved the way for devices like computers, smartphones, and e-readers, enhancing accessibility, communication, and convenience. However, this transition has not come without challenges. One major issue linked to the increased use of digital devices is digital eye strain (DES), defined by a constellation of symptoms stemming from prolonged exposure to digital screens.

According to the American Optometric Association (AOA), DES encompasses a range of vision and ocular discomfort symptoms associated with extended use of computers, tablets, smartphones, and e-readers (1).

The ocular symptoms of DES include burning eyes, watery eyes, redness, and discomfort from prolonged screen exposure. Additionally, asthenopia (a condition characterized by headaches, dry eyes, eye strain, and blurred vision) often emerges as a byproduct of excessive screen use (2). Beyond ocular symptoms, DES

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has extra-ocular manifestations, including neck pain and back pain, exacerbated by poor ergonomic postures during device use. This is indicative of how prolonged and repetitive screen-related activity has a multi-faceted impact on health (3).

The Vision Council reported that approximately 70% of adults experience at least one symptom associated with DES (4). These findings underscore a growing trend, especially as technological devices have become integral to daily routines, work environments, and education systems. Reports also suggest that children and adolescents are particularly vulnerable due to earlier and extended exposure to electronic devices (5).

Tahir et al. (2022) conducted a cross-sectional survey examining DES among radiologists, identifying female gender, long working hours, and flickering digital screens as prominent risk factors for DES (6). However, data focusing on younger populations, especially school-aged individuals, remain sparse, despite the rising prevalence of devices in education and leisure activities.

The primary purpose of this study is to assess the awareness and understanding of DES among high school students and evaluate the extent of symptoms and their impact on the students' ocular health. The findings aim to bridge knowledge gaps by providing a clearer picture of the effects of prolonged screen time among youth and highlighting strategies employed by this demographic to mitigate these effects.

This study also emphasizes the importance of preventive strategies such as the 20-20-20 rule, regular breaks, screen adjustment, and environmental adaptations in reducing DES. Additionally, by identifying awareness levels, the study aims to foster public health initiatives promoting education and safe screen habits. Given the rapid technological advancements in education and society, raising awareness on this issue holds critical importance for long-term eye health in the younger population.

To contribute to this understanding, this study will explore a range of variables, including screen use patterns, awareness levels, health-seeking behavior related to DES symptoms, and the adoption of preventive strategies. By doing so, it will pave the way for developing community education programs, prevention strategies, and recommendations for interventions to combat the adverse effects of DES among students.

## METHODOLOGY

This study employed a cross-sectional, observational design to evaluate awareness and experiences related to DES among high school students in Lahore, Pakistan. The study was conducted over a four-month period following ethical approval and adherence to established research protocols.

The study population included students from Crescent Model High Secondary School, Lahore. Using a convenient sampling method, 152 students aged between 13 and 20 years were recruited. Inclusion criteria encompassed children aged 13-20 years, with daily screen time of at least three hours and a history of using screens for more than two years. Exclusion criteria consisted of participants under 12 years old, those spending less than three hours daily on screens, students without prior screen exposure, and individuals with preexisting ocular conditions (e.g., meibomian gland dysfunction, pterygium, or pinguecula).

Participants were provided with a structured questionnaire to collect demographic data, screen time duration, symptoms related to prolonged screen use, and knowledge of DES and its associated risks. Variables included screen time duration, gender, daily usage duration, and the presence of symptoms like headaches, eye strain, and dry eyes. Statistical analysis was conducted using SPSS version 21. Descriptive statistics were employed for categorical data (frequencies and percentages), while quantitative variables were represented using mean and standard deviation.

## RESULTS

In the cross-sectional survey to aware the people of digital eye strain and its effects of ocular health of young population, data was collected from 152 school going students. Maximum respondents i.e. 65.8% students off age 15-16 years and 54,6% were males.

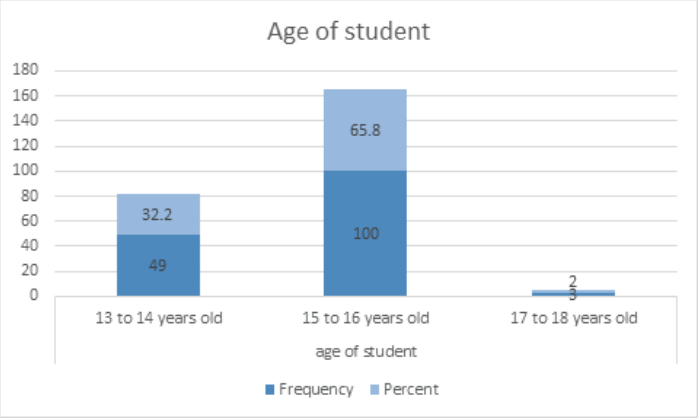


**Figure-1: Frequency and percentage of age of participants**

Figure shows that 49 (32.2%) participants were of 13-14 years of age group, 100 (65.8%) participants were of 15-16 years of age group and 3 (2%) participants were of 17-18 years of age group. The mean S.D were calculated to be 0.57217.

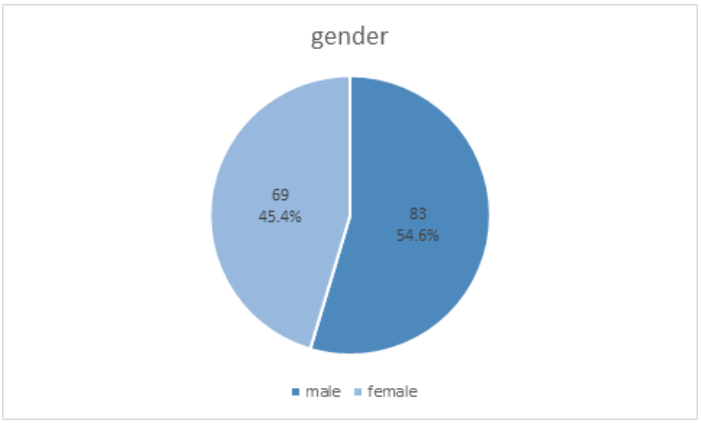


**Figure-2: Frequency and percentage of Gender of participants**

Figure shows that statistics for gender were 69 (45.4%) participants were males and 83(54.6%) were females.

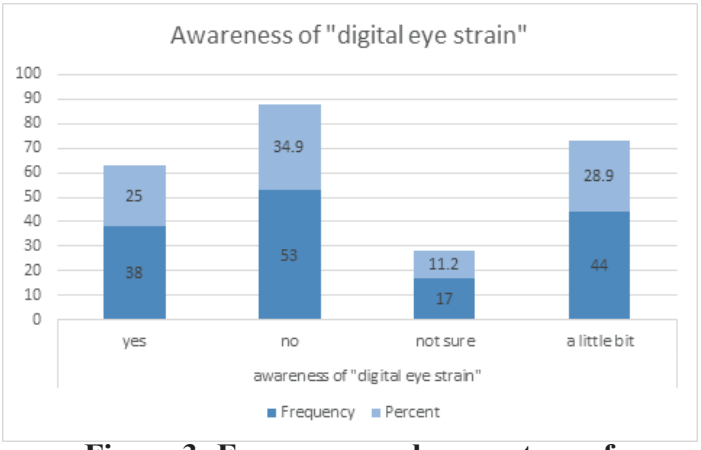


**Figure 3: Frequency and percentage of awareness of "digital eye strain"**

Figure shows that 38 (25%) participants reported yes, 53 (34.9%) participants reported no, 17 (11.2%) participants reported not sure and 44(28.9%) participants reported a little bit awareness of digital eye strain.

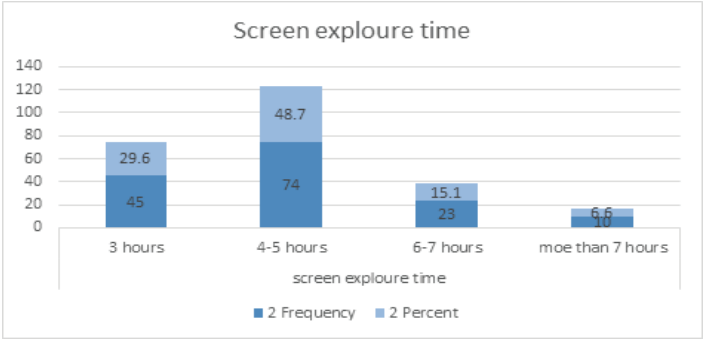


**Figure 4: Frequency and percentage of screen explore time**

Figure 4 shows that 45 (29.6%) participants reported spending 3 hours per day looking at screens, 74 (48.7%) participants reported spending 4 to 5 hours per day, 23 (15.1%) participants reported spending 6 to 7 hours per day, and 10 (6.6%) participants reported spending more than 7 hours per day.

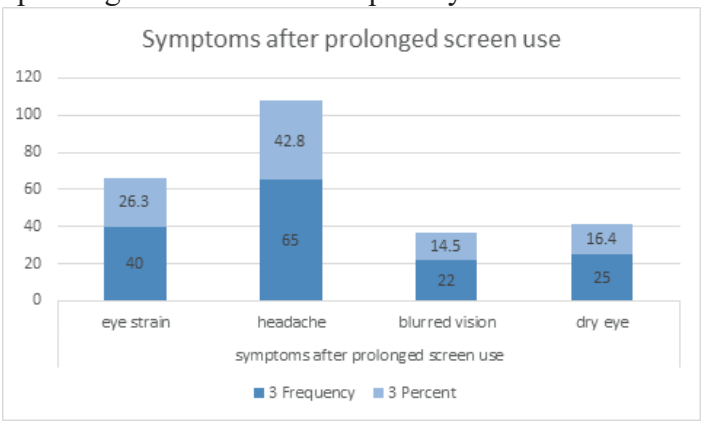


**Figure 5: Frequency and percentage of symptoms after prolonged screen use**

Figure shows that 40 (26.3%) participants reported experiencing eye strain, 65 (42.8%) participants reported experiencing headaches, 22 (14.5%) participants reported experiencing blurred vision, and 25 (16.4%) participants reported experiencing dry eye after prolonged screen use.

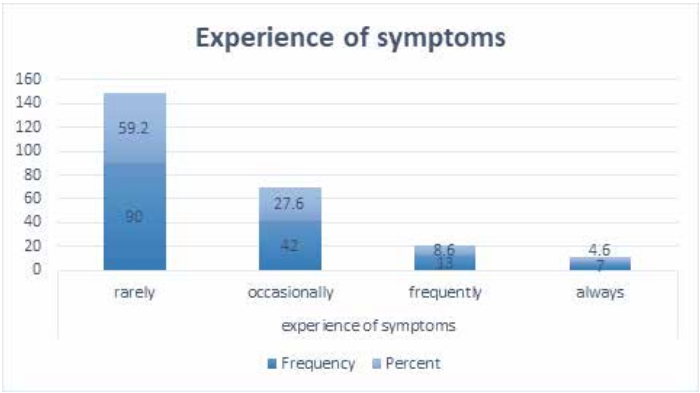


**Figure 6: Frequency and percentage of experience of symptoms**

Figure shows that 90 (59.2%) participants reported rarely experiencing these symptoms, 42 (27.6%) participants reported occasionally experiencing these symptoms, 13 (8.6%) participants reported frequently experiencing these symptoms, and 7 (4.6%) participants reported always experiencing these symptoms.

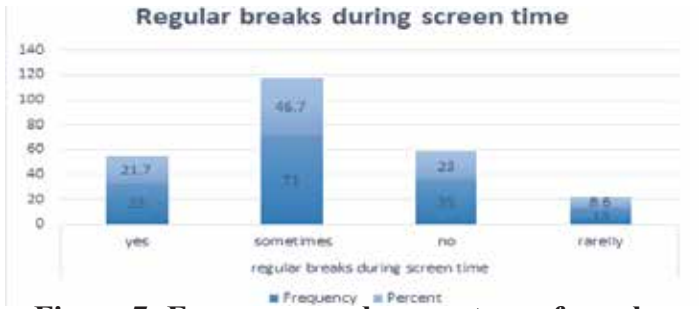


**Figure 7: Frequency and percentage of regular breaks during screen time**

Figure shows that 33 (21.7%) participants reported yes, 71 (46.7%) participants reported sometimes, 35 (23.0%) participants reported no, and 13 (8.6%) participants reported rarely taking regular breaks when using screens for an extended period.

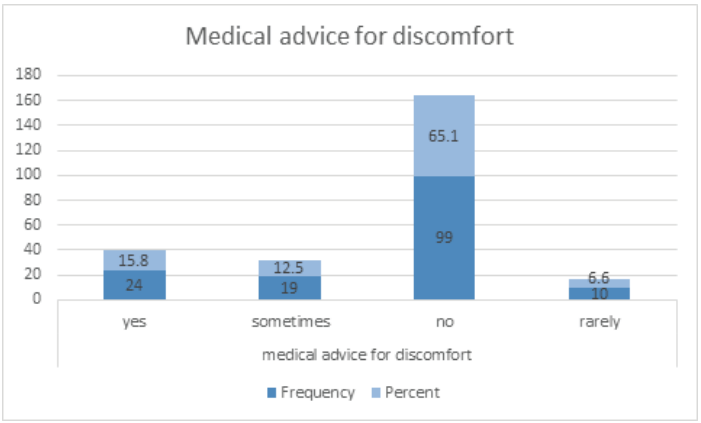


**Figure 8: Frequency and percentage of medical advice for discomfort**

Figure shows that 24 (15.8%) participants reported yes, 19 (12.5%) participants reported sometimes, 99 (65.1%) participants reported no, and 10 (6.6%) participants reported rarely having sought medical advice or treatment for eye discomfort related to screen use.

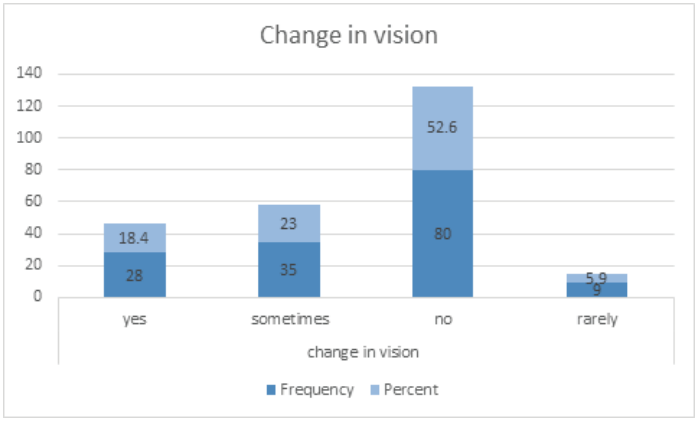


**Figure 9: Frequency and percentage of change in vision**

Figure shows that 28 (18.4%) participants reported yes, 35 (23.0%) participants reported sometimes, 80 (52.6%) participants reported no, and 9 (5.9%) participants reported rarely noticing any changes in their vision since using screens regularly.

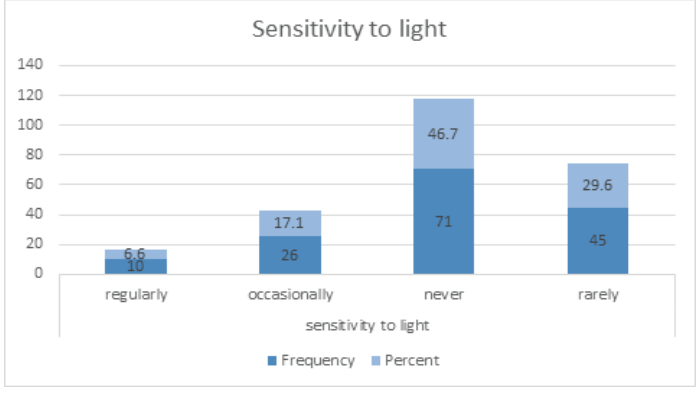


**Figure 10: Frequency and percentage of sensitivity to light**

Figure shows that 10 (6.6%) participants reported experiencing sensitivity to light (photophobia) regularly, 26 (17.1%) participants reported experiencing it occasionally, 71 (46.7%) participants reported never experiencing it, and 45 (29.6%) participants reported rarely experiencing it during or after screen use.

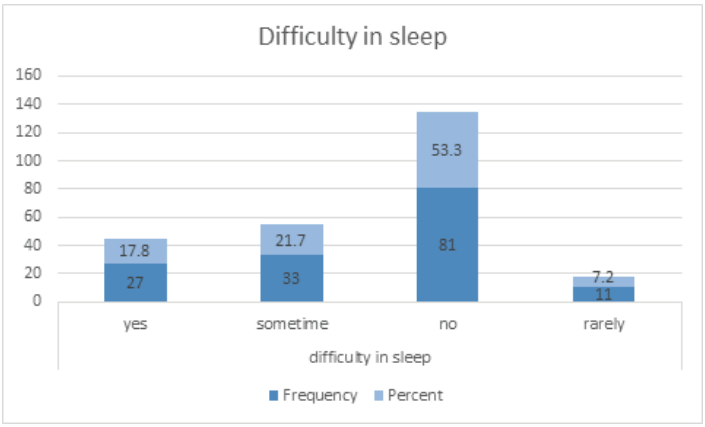


**Figure 11: Frequency and percentage of difficulty in sleep**

Figure shows that 27 (17.8%) participants reported yes, 33 (21.7%) participants reported sometimes, 81 (53.3%) participants reported no, and 11 (7.2%) participants reported rarely finding it difficult to fall asleep when using screens for tasks that require intense focus.

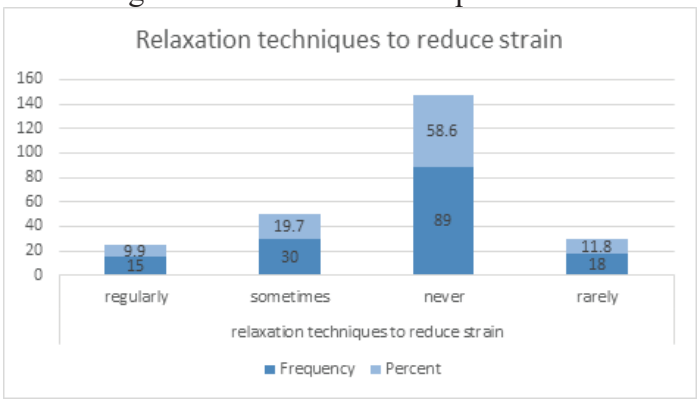


**Figure 12: Frequency and percentage of relaxation techniques to reduce strain**

Figure shows that 15 (9.9%) participants reported regularly engaging in eye exercises or relaxation techniques to reduce strain from screen use, 30 (19.7%) participants reported sometimes, 89 (58.6%) participants reported never, and 18 (11.8%) participants reported rarely engaging in these practices.

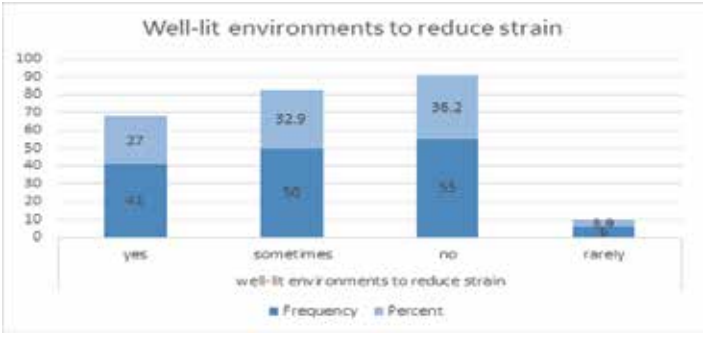


**Figure 13: Frequency and percentage of well-lit environments to reduce strain**

Figure shows that 41 (27.0%) participants reported yes, 50 (32.9%) participants reported sometimes, 55 (36.2%) participants reported no, and 6 (3.9%) participants reported rarely using screens in well-lit environments to reduce strain on their eyes.

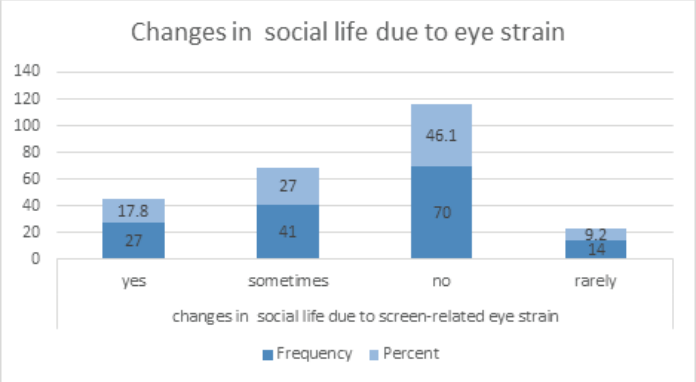


**Figure 5.14: Frequency and percentage of changes in social life due to eye strain**

Figure shows that 27 (17.8%) participants reported yes, 41 (27.0%) participants reported sometimes, 70 (46.1%) participants reported no, and 14 (9.2%) participants reported rarely noticing any changes in their social life or relationships due to screen-related eye strain.

## DISCUSSION

Digital eye strain (DES) is a multifaceted health problem exacerbated by the modern lifestyle, particularly among students who spend extended hours using digital devices. This study explored the relationship between prolonged screen use, awareness levels, and reported symptoms of DES among high school students, revealing insights into the underlying behaviors and knowledge gaps.

Our findings indicate that students experience common symptoms of DES, such as headaches (42.8%), eye strain (26.3%), dry eyes (16.4%), and blurred vision (14.5%). Despite these symptoms, preventive measures were inconsistently adopted. Only 21.7% of students took regular breaks, while 46.7% reported doing so only sometimes. The majority did not utilize eye exercises or environmental changes like ensuring well-lit areas, suggesting a lack of effective preventative strategies.

Studies have shown that ergonomics, including posture correction and adjustments to screen brightness, can reduce symptoms of DES. Proper ergonomic practices, such as maintaining an appropriate distance from devices, proper lighting, and adhering to the 20-20-20 rule, are vital interventions (5). However, our findings indicate poor adoption rates of these practices among the surveyed students.

Similar studies support these findings. For instance, youth in regions with extensive screen exposure exhibit higher rates of DES-related symptoms due to poor screen habits and limited preventive strategies (7, 8). Furthermore, social aspects such as concentration and relationships were also impacted by DES, with 17.8% reporting changes in their social interactions due to these symptoms, aligning with global trends showing psychological effects related to prolonged screen use (9).

The lack of adequate public health education highlights the knowledge gap contributing to this issue. Studies show that awareness campaigns can foster behavior change by addressing misconceptions and encouraging simple, low-cost interventions (10). Proactive measures such as parental guidance, education programs, and technology interventions could substantially mitigate DES risks (11).

Overall, raising awareness and promoting interventions—such as the 20-20-20 rule, regular breaks, and screen modifications—are critical to addressing DES. Our findings emphasize the urgent need for integrated health promotion strategies to combat this modern health problem.

## CONCLUSION

This study reveals a significant knowledge gap regarding DES among high school students. Despite experiencing common symptoms such as headaches, dry eyes, and blurred vision, most participants lack awareness of effective preventive strategies. In our increasingly digital world, educational initiatives to raise awareness about the causes and management of DES are essential. Encouraging students to adopt proactive strategies like breaks and adjusting lighting can mitigate these effects. Addressing this issue through community health education may improve ocular health outcomes for the younger population.

- DES is prevalent among students exposed to prolonged screen time.
- Awareness is low, with only 25% recognizing it as a significant health issue.
- Preventive strategies are underutilized.

**Comparison with Existing Literature**

The findings align with studies reporting that symptoms of DES impact both social and cognitive well-being among youth. Furthermore, DES affects academic performance by impairing focus and concentration, consistent with these findings.

**Recommendations**

- Implement health education programs to raise awareness about DES.
- Encourage students to adopt the 20-20-20 rule and other ergonomic practices.
- Promote regular medical advice for persistent symptoms.

**Limitations**

- Study conducted over a short four-month period.
- Limited to students aged 13–20 years, potentially excluding broader demographics.
- Relied on self-reported responses, which may carry biases.

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**Authors Contributions:**

**Nimra Fatima and Izza Fatima:** Substantial contributions to the conception and design of the work.

**Rubab and Zarwa:** Design of the work and the acquisition. Drafting the work.

**Amna Shahid:**Final approval of the version to be published.

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