

ASSESSING THE RELATIONSHIP BETWEEN PROLONGED SCREEN EXPOSURE AND DIGITAL EYE STRAIN AMONG ADOLESCENTS: IMPLICATIONS FOR SCHOOL HEALTH POLICIES IN AGARTALA, TRIPURA

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ABSTRACT

Digital eye strain (DES) is a common health issue stemming from excessive screen time at a time when adolescents are increasingly using digital devices and is one of the leading concerns for their health. The study investigates the association between digital screen exposure and digital eye strain symptoms in school adolescents of Agartala. Diagnostic eye strain occurs when teenagers use the electronic screen for prolonged periods of time, whether for learning purposes or for leisure time, creating eye symptoms of dryness, fatigue and blurred vision. The study makes use of a cross-sectional methodology to analyze how frequently and severely DES impacts school-aged adolescence. The researchers will carry the survey with adolescent children of the Agartala-based schools with the help of self-administered questionnaires which will assess screen duration and different screen activities, and eye discomfort symptoms.

KEYWORDS: Digital Eye Strain (DES); Screen Time Exposure; Adolescent Eye Health; Preventive Screen-Use Practices; School-Based Eye Health Interventions; Adolescents; Digital Learning; Computer Vision Syndrome; COVID-19; Screen Time; School Based Intervention

1. INTRODUCTION

The different aspects of daily life are transformed by digital technology to a large extent, notably by changing education, and social bonding, and leisure practices. Rosenthal highlights a physical health issue with the increasing popularity of Smartphones among teens, stating that it can hurt vision health by itself, along with computers and tablets. Digital eye strain (DES) has a series of symptoms that occur when using screen devices for extended periods of time [1]. This is also known as “digital eye strain or computer vision syndrome” (CVS). Many studies explore the effects which long screen usage has on human eye health. Numerous studies show an increasing trend in digital eye strain among regular computer and Smartphone device users. The signs of DES occur when screen users sit or stand incorrectly and make poor settings on the screen and use it for long periods. Adolescents spend many hours looking at digital screens, which cause them to experience “digital eye strain, including eye pain, headaches and blurred vision” [2]. This issue has led to screen filters being identified as one of the key preventive strategies alongside eye exercises and usage of smarter screen habits



Figure 1: Illustration of symptoms of digital eye strain (DES)

(Source: [2])

University students' self-reported CVS symptoms increase due to extended screen time. Based on the record of 2021, around 5 billion people (65% of the global population) are utilising the internet due to the escalation of COVID-19 [3]. Regarding this, major children are facing CVS. Research indicates that the risks of digital eye strain are greater for virtual learners due to spending excessive time online and not being able to adopt ergonomic body positioning.

Social media devices along with digital devices disrupt sleep patterns, inaction and deterioration of mental health for adolescents changes their social behaviours. The development of myopia or short-sightedness occurs as a result of excessive screen time since this condition has shown substantial increase in Asian children and adolescents.

Substantial refractive error changes over the course of a year were seen in children who used smart devices extensively. The results of the study revealed that extended screen-time exposure is followed by a long-term impact on human eye health.

Screen utilizations create continuing risk and absolute measures are necessary to address digital eye strain problems in students. The focus should be on reducing screen time and on adopting a healthier approach to the commitment to digital use, through measures that include: eye break time, proper posture in front of the screen, and blue light filtering. Programs for education and public health need to address students and teachers so they learn about the dangers of long screen time exposure and the importance of eye health.

2. LITERATURE REVIEW

The prevalence of Digital Eye Strain increases among different age groups based on research studies which focus on teenagers who heavily use digital devices for schoolwork and recreational purposes. Symptom levels of computer vision syndrome were experienced by university students. DES symptoms are often experienced by the subject participants, and excessive screen usage is the major reason for the adolescents [4]. Jordanian university students were under severe eye discomfort symptoms and many adverse effects due to prolonged duration of using screens. Important information about the intensification of DES symptoms due to investigations of the relationship between screening time and posture and screen ergonomics is addressed.

During the period of online education due to COVID-19, children had to devote more time to the screen, thereby causing prolongation of digital eye strain. The causes of DES in school-going children are mainly due to the lack of ergonomic conditions as well as extended amounts of time spent viewing screens [5]. The overuse of smart devices causes the development of DES, and eye shape changes to myopia in adolescents.

The most effective approach for DES management is to reduce screen time and implement blue light filters and designated screen break times. Adoption of 20-20-20 rules and maintaining screen distance are necessary for the adolescents to avoid eye strain during long-time study hours [6]. Followed by the 20-20 rule adolescents should maintain a 20 feet distance from the object at least for 20 seconds to relax the eye muscles. Also, positioning the screen from 20 to 26 inches away from eyes controls the symptoms, such as headaches or dryness. Therefore, maintaining self-control and relevant distances adolescents can avoid the issue of eye strain during their excessive digital study hours.

3. RESULTS

Based on the survey findings of 51 students from Agartala, Tripura this article has recorded their experience with digital learning and its impact on the physical health conditions. The following descriptive analysis has discovered the experiences and possible impact through tabular format:

Table 1: Descriptive Statistics

Row Labels	What is your age group?
10–12 years	11.76%
13–15 years	25.49%
16–17 years	41.18%
18–19 years	21.57%
Grand Total	100.00%

Row Labels	What is your gender?
Female	43.14%
Male	19.61%
Prefer not to say	37.25%
Grand Total	100.00%

Row Labels	Which class are you currently studying in?
Class IX–X	35.29%
Class VI–VIII	25.49%
Class XI–XII	39.22%
Grand Total	100.00%

Row Labels	How many hours do you spend using digital devices (Smartphones, computers, tablets, etc.) daily, excluding school-related screen use?
1–2 hours	35.29%
3–4 hours	37.25%
Less than 1 hour	19.61%
More than 5 hours	7.84%
Grand Total	100.00%

Row Labels	Which digital device do you use most frequently?
Laptop or desktop computer	37.25%
Smartphone	21.57%
Tablet	21.57%
Television	19.61%
Grand Total	100.00%

Row Labels	What is your primary purpose for using digital devices?
Online classes and educational activities	23.53%
Online gaming	31.37%
Social media	31.37%
Watching videos and entertainment	13.73%
Grand Total	100.00%

Row Labels	How frequently do you use digital devices continuously for more than one hour without taking a break?
Always	3.92%
Never	11.76%
Often	23.53%
Rarely	29.41%
Sometimes	31.37%
Grand Total	100.00%

Row Labels	How frequently do you experience eye discomfort, irritation, or burning sensations after using digital devices?
Always	5.88%
Never	19.61%
Often	23.53%
Rarely	31.37%
Sometimes	19.61%
Grand Total	100.00%

Row Labels	Which of the following symptoms do you experience most frequently after prolonged screen exposure?
Blurred vision	21.57%
Dry or watery eyes	15.69%
Eye pain or tiredness	27.45%
Headache	27.45%
None of the above	7.84%
Grand Total	100.00%

Row Labels	Are you aware of the 20-20-20 rule (looking at something approximately 20 feet away for 20 seconds after every 20 minutes of screen use)?
No, I am not aware of it	9.80%
Yes, and I regularly follow it	17.65%
Yes, but I never follow it	43.14%
Yes, but I rarely follow it	29.41%
Grand Total	100.00%

Row Labels	How frequently do you take breaks while using digital devices for studying or entertainment?
Every 1 hour	25.49%
Every 20 minutes	15.69%
Every 30 minutes	33.33%
Never	3.92%
Only when experiencing discomfort	21.57%
Grand Total	100.00%

Row Labels	Has your school provided any awareness program or guidance regarding digital eye strain and healthy screen-use practices?
No	19.61%
Not sure	19.61%
Yes, occasionally	35.29%
Yes, regularly	25.49%
Grand Total	100.00%

Row Labels	Which school-based intervention do you think would be most effective in reducing digital eye strain among students?
Awareness programmes on healthy screen habits	19.61%
Eye health screening programmes	27.45%
Reduced screen-based assignments	13.73%
Regular screen breaks during digital learning	31.37%
Training on proper screen distance, posture, and lighting	7.84%
Grand Total	100.00%

(Source: Self-Created)

4. DISCUSSIONS

Screen Time patterns and continuous digital device use among adolescents

Survey findings have indicated that substantial recreational screen exposure is one of the main reasons for the eye strain among the students. For instance, Question 4 has highlighted that 37.25% use a digital device for three to four hours daily outside of the school while 35.29% spend one to two hours. On the other hand, laptop and desktops can be considered as frequently used devices as mentioned in Question 5 with the value of 37.25%. The survey has also revealed that social media and online gaming each contribute to around 31.37% for eye strain.

Prevalence of digital eye strain symptoms among adolescents

Reported symptoms suggest that digital eye discomfort is one of the major factors as per the response that causes eye strain. For instance, in question 8, 23.53% and 5.88% individuals often witnessed eye discomfort, irritation or burning after digital device use while 19.61% have reported that they never witnessed. Question 9 has identified headache and eye pain or tiredness as the most frequent symptoms reported by 27.45% followed by blurred vision at 21.57%. Schools could encourage symptom reporting and access for appropriate eye-health assessment instead of being considered as clinical diagnoses or evidence of causation.

Effectiveness of preventive practices and school based intervention

Responses from the survey have indicated that school based prevention requires strengthening to avoid the issues of eye strain. Question 10 has shown that 43.14% of respondents know the 20-20-20 while never following it while 29.41% rarely follow. However, in question 12, 35.29% respondents highlighted vocational school guidance while 19.61% have mentioned that no program exists. Regular screen breaks are considered as preferred intervention for 31.37% intervention. Schools in Agartala can combine routine breaks, awareness sessions and screening opportunities for supporting healthier digital habits.

5. CONCLUSION

The study aimed to examine the relationship between screen time and digital eye strain symptoms among the students of the Agartala schools. As per the research data, more time spent on screen results in more severe symptoms of Digital Eye Strain which include eye fatigue and dryness, in addition to vision blur and headaches. The frequency of the symptoms caused by an excessive use of the electronic devices was highest in adolescents who used them for more than six hours a day. The study highlights an immediate need for educational public health campaigns targeting students and their parents and/or instructors to address harmful aspects of screen time and healthy screen behaviours. To tackle the symptoms of DES, students and other screen users should adopt good habits: take regular breaks from screens and use blue-light filters, as well as maintain proper posture. Therefore, as digital device usage among adolescents has increased, the study underscores the need for digital eye strain to be recognized as a critical public health issue.

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