

# A Descriptive Study to Assess the Prevalence of Digital Eye Strain and Associated Self-Care Practices Among Nursing Students.

Garima Gupta, Deepak Kumar Singh, Sheetal Singh\*

Sharda School of Nursing Science and Research, Sharda University, Greater Noida, Uttar Pradesh, India.

## ABSTRACT

**Background:** Digital devices have become an integral part of nursing education, with students increasingly using smartphones, laptops, tablets and computers for learning, assignments, online classes, literature searches and communication. Prolonged screen exposure may be accompanied by digital eye strain and related ocular and musculoskeletal symptoms. **Objectives:** To assess the prevalence of digital eye strain among nursing students, evaluate associated self-care practices, explore associations with selected demographic and digital-device usage variables, and determine the relationship between digital eye strain and self-care practices. **Methods:** A quantitative descriptive study was conducted among 110 B.Sc. Nursing students of Sharda University, Greater Noida, using non-probability convenience sampling. Data were collected with a structured self-administered questionnaire containing 32 items across five sections: socio-demographic characteristics, digital-device usage, symptoms of digital eye strain, self-care practices, and knowledge and awareness. Descriptive statistics were used to summarize the findings; the study protocol also specified chi-square testing for applicable associations at  $p < 0.05$ . **Results:** Daily digital-device exposure was substantial: 87.3% of participants reported more than two hours of device use per day, while 58.2% reported more than four hours. The most frequently reported symptoms were headache after screen use (79.1%) and neck or shoulder pain (78.2%), followed by difficulty focusing (64.5%), eye strain/tired eyes (60.0%), burning sensation (60.0%), sensitivity to light (58.2%), excessive watering (56.4%), dry eyes (54.5%), blurred vision (51.8%) and eye redness (42.7%). Risk-related usage practices were common: 76.4% used devices in dark or low-light conditions and 82.7% used devices while lying down. Awareness was relatively high, with 73.6% aware of digital eye strain and 89.1% aware that prolonged screen use can affect eye health; however, preventive practices were less consistent. Only 22.7% regularly followed the 20-20-20 rule, 65.5% did not perform eye-relaxation exercises, and 72.7% did not use artificial tears or eye drops. **Conclusions:** The study identified a substantial burden of digital-device-related symptoms among the nursing students studied, together with a marked gap between knowledge and consistent self-care practice. Practical eye-health education, reinforcement of break routines and supportive learning environments may help students adopt healthier digital-device habits.

**Keywords:** Digital Eye Strain, Computer Vision Syndrome, Nursing Students, Screen Time, Self-Care Practices, Eye Health, Digital Devices

## INTRODUCTION

The rapid expansion of digital technology has transformed nursing education. Nursing students increasingly depend on smartphones, laptops, tablets, desktop computers and online learning platforms for lectures, academic resources, assignments, literature searches, examinations and communication. As screen exposure becomes a routine part of academic life, prolonged and continuous digital-device use may be accompanied by ocular and visual discomfort.[1,2]

Digital eye strain (DES), also referred to as computer vision syndrome, describes a cluster of eye- and vision-related complaints associated with prolonged digital-screen use. Commonly reported symptoms include eye, fatigue, dryness, burning, irritation, watering, blurred vision, difficulty focusing and headache.[3,5] Musculoskeletal complaints such as neck and shoulder discomfort may occur alongside visual symptoms, particularly when devices are used for prolonged periods in suboptimal postures.

The clinical manifestations of digital eye strain can be broadly categorized into external ocular symptoms

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and internal visual symptoms. External symptoms include eye dryness, irritation, burning sensations, excessive tearing, redness, and a feeling of discomfort in the eyes. Internal symptoms may include blurred vision, difficulty focusing, eye fatigue, headaches, and discomfort during prolonged near-vision activities [7,12]. Some individuals may also experience neck, shoulder, and back discomfort associated with prolonged sitting and inappropriate posture while using digital devices [13]. These symptoms may interfere with concentration, reading efficiency, academic performance, and overall well-being.

The occurrence and severity of symptoms may be influenced by duration of screen exposure, uninterrupted screen sessions, viewing distance, lighting, screen brightness, posture and other digital-device habits [8,10]. Modifiable factors include prolonged uninterrupted screen exposure, excessive screen brightness, improper screen positioning, inadequate ambient lighting, poor posture, and failure to take regular breaks. Individual factors, such as pre-existing refractive errors, use of corrective lenses, and pre-existing ocular discomfort, may also influence the experience of symptoms. Understanding these factors is important because appropriate modifications in device usage patterns and visual ergonomics may help reduce discomfort and support healthier digital learning habits [11,14].

Nursing students represent an important population because their academic and professional preparation requires substantial digital engagement. At the same time, they are future health educators who may be expected to promote healthy technology-use practices among patients and communities [15,16].

Self-care measures commonly described in the thesis include taking regular breaks, following the 20-20-20 rule, maintaining appropriate viewing distance, adjusting screen brightness, ensuring adequate lighting, performing eye-relaxation practices and seeking professional eye care when symptoms persist [9,17]. The present study was undertaken to describe the occurrence of digital eye strain and the self-care practices of B.Sc. Nursing students at Sharda University.

### **Aim and Objectives**

**Aim:** To assess the prevalence of digital eye strain and to evaluate the associated self-care practices among nursing students at Sharda University.

- To estimate how common digital eye strain is among the nursing students of Sharda University.
- To examine the self-care practices that nursing students follow while using digital devices.
- To explore whether digital eye strain is linked with selected demographic characteristics.
- To ascertain how digital eye strain relates to the self-care practices students adopt.

## **METHODS AND MATERIALS**

### **Research design and setting**

A quantitative descriptive research design was adopted. The study was conducted among B.Sc. Nursing students of Sharda University, Greater Noida, Uttar Pradesh, India. The setting was selected because it provided access to the intended student population and allowed data collection within the available study period.

### **Population, sample and sampling**

The study population comprised B.Sc. Nursing students of Sharda University. A sample of 110 students who met the eligibility criteria and consented to participate was selected by non-probability convenience sampling.

### **Eligibility criteria**

Students enrolled in the B.Sc. Nursing programme, willing to participate, present during data collection, able to read and respond to the questionnaire, users of digital devices, and willing to provide informed consent were included. Students who were unwilling or absent, could not complete or understand the questionnaire, or had a serious pre-existing eye condition that could interfere with assessment of digital eye strain were excluded, as applicable under the study protocol.

### **Data collection tool**

Data were collected using a structured self-administered questionnaire containing 32 items divided into five sections. Section A assessed socio-demographic characteristics; Section B assessed digital-device usage patterns; Section C assessed ten symptoms of digital eye strain using frequency response categories; Section D assessed six self-care practices; and Section E assessed four areas of knowledge and awareness. Sections A and B formed the pre-test and Sections C,

D and E formed the post-test according to the thesis study procedure.

### Validity, reliability and pilot study

Content validity of the questionnaire was established through expert review for relevance, clarity, appropriateness and adequacy. The thesis records reliability testing and states that the resulting reliability coefficient was within an acceptable range, but does not report the numerical coefficient in the manuscript-ready methodology. A pilot study was conducted among eligible nursing students who were not included in the final sample to assess feasibility, clarity, wording, instructions and completion time.

### Data collection and ethics

Formal permission was obtained from the concerned authority at Sharda University. Participants were informed about the study purpose and procedure, and written informed consent was obtained before questionnaire administration. Participation was voluntary, confidentiality and anonymity were maintained, and

participants could withdraw without penalty. Ethical approval/clearance was obtained as applicable under the study protocol.

### Data analysis

Frequency and percentage were used to describe socio-demographic characteristics, digital-device usage patterns, symptoms, self-care practices, and knowledge and awareness. Mean and standard deviation were planned wherever applicable. The study protocol specified the chi-square test for examining associations between digital eye strain and selected socio-demographic and digital-device usage variables, with statistical significance set at  $p < 0.05$ . The thesis sections available for manuscript preparation report descriptive findings but do not provide the detailed chi-square association tables; therefore, no unreported inferential result has been added here.

## RESULTS

### Socio-demographic characteristics

**Table 1: Socio-demographic Characteristics of Participants (N = 110)**

| Variable         | Category    | n  | %    |
|------------------|-------------|----|------|
| Age              | 17–18 years | 9  | 8.2  |
| Age              | 19–20 years | 53 | 48.2 |
| Age              | 21–22 years | 46 | 41.8 |
| Age              | >22 years   | 2  | 1.8  |
| Gender           | Female      | 64 | 58.2 |
| Gender           | Male        | 46 | 41.8 |
| Semester         | 1st         | 8  | 7.3  |
| Semester         | 2nd         | 69 | 62.7 |
| Semester         | 3rd         | 20 | 18.2 |
| Semester         | 4th         | 1  | 0.9  |
| Semester         | 5th         | 4  | 3.6  |
| Semester         | 6th         | 3  | 2.7  |
| Semester         | 8th         | 5  | 4.5  |
| Residence        | Home        | 51 | 46.4 |
| Residence        | Hostel      | 39 | 35.5 |
| Residence        | PG/Other    | 20 | 18.2 |
| Daily device use | <2 hours    | 14 | 12.7 |
| Daily device use | 2–4 hours   | 32 | 29.1 |
| Daily device use | 4–6 hours   | 41 | 37.3 |
| Daily device use | >6 hours    | 23 | 20.9 |

The sample was predominantly young: 48.2% were aged 19–20 years and 41.8% were aged 21–22 years. Females constituted 58.2% of participants. Most participants were in the second semester (62.7%). Nearly half lived at home (46.4%), while 35.5% lived in

hostels and 18.2% in PG/other accommodation. Device use was substantial, with 37.3% reporting 4–6 hours and 20.9% reporting more than 6 hours of daily device use.

**Digital-device usage patterns****Table 2: Selected Digital-Device Usage Patterns (N = 110)**

| Variable                     | Category   | n  | %    |
|------------------------------|------------|----|------|
| Main study device            | Smartphone | 66 | 60.0 |
| Main study device            | Laptop     | 35 | 31.8 |
| Main study device            | Tablet     | 6  | 5.5  |
| Main study device            | Desktop    | 3  | 2.7  |
| Continuous use without break | <30 min    | 27 | 24.5 |
| Continuous use without break | 30–60 min  | 45 | 40.9 |
| Continuous use without break | 1–2 hours  | 27 | 24.5 |
| Continuous use without break | >2 hours   | 11 | 10.0 |
| Total daily exposure         | <3 hours   | 26 | 23.6 |
| Total daily exposure         | 3–5 hours  | 37 | 33.6 |
| Total daily exposure         | 5–8 hours  | 28 | 25.5 |
| Total daily exposure         | >8 hours   | 19 | 17.3 |
| Use in dark/low light        | Yes        | 84 | 76.4 |
| Use in dark/low light        | No         | 26 | 23.6 |
| Use while lying down         | Yes        | 91 | 82.7 |
| Use while lying down         | No         | 19 | 17.3 |
| Takes breaks                 | Yes        | 71 | 64.5 |
| Takes breaks                 | Sometimes  | 27 | 24.5 |
| Takes breaks                 | No         | 12 | 10.9 |
| Blue-light filter/night mode | Yes        | 69 | 62.7 |
| Blue-light filter/night mode | No         | 41 | 37.3 |

The smartphone was the main study device for 60.0% of participants. Continuous screen use for 30–60 minutes was reported by 40.9%, while 34.5% reported sessions of one hour or more without a break. Overall, 76.4% reported more than three hours of total daily

screen exposure. Use in dark or low-light conditions was reported by 76.4%, and 82.7% reported using devices while lying down.

**Symptoms of digital eye strain****Table 3: Participants Reporting Each Digital-Eye-Strain Symptom at Least Occasionally (N = 110)**

| Symptom                    | n  | %    |
|----------------------------|----|------|
| Headache after screen use  | 87 | 79.1 |
| Neck/shoulder pain         | 86 | 78.2 |
| Difficulty focusing        | 71 | 64.5 |
| Eye strain/tired eyes      | 66 | 60.0 |
| Burning sensation          | 66 | 60.0 |
| Sensitivity to light       | 64 | 58.2 |
| Excessive watering/tearing | 62 | 56.4 |
| Dry eyes                   | 60 | 54.5 |
| Blurred vision             | 57 | 51.8 |
| Eye redness                | 47 | 42.7 |

Headache after screen use was the most frequently reported symptom (79.1%), followed by neck or shoulder pain (78.2%). Difficulty focusing was reported by 64.5%, while eye strain/tired eyes and burning sensation were each reported by 60.0%. More than half of participants reported sensitivity to light, excessive watering, dry eyes and blurred vision. Eye

redness was the least frequently reported symptom at 42.7%.

**Self-care practices and awareness**

**Table 4: Self-care Practices and Awareness Related to Digital Eye Strain (N = 110)**

| Item                                          | Response     | n  | %    |
|-----------------------------------------------|--------------|----|------|
| 20-20-20 rule                                 | Yes          | 25 | 22.7 |
| 20-20-20 rule                                 | Sometimes    | 24 | 21.8 |
| 20-20-20 rule                                 | No           | 61 | 55.5 |
| Artificial tears/eye drops                    | Yes          | 17 | 15.5 |
| Artificial tears/eye drops                    | Occasionally | 13 | 11.8 |
| Artificial tears/eye drops                    | No           | 80 | 72.7 |
| Reduce screen brightness                      | Always       | 54 | 49.1 |
| Reduce screen brightness                      | Sometimes    | 52 | 47.3 |
| Reduce screen brightness                      | Never        | 4  | 3.6  |
| Proper screen distance                        | Yes          | 58 | 52.7 |
| Proper screen distance                        | Sometimes    | 18 | 16.4 |
| Proper screen distance                        | No           | 34 | 30.9 |
| Eye relaxation exercises                      | Yes          | 38 | 34.5 |
| Eye relaxation exercises                      | No           | 72 | 65.5 |
| Eye specialist consultation                   | Yes          | 42 | 38.2 |
| Eye specialist consultation                   | Rarely       | 18 | 16.4 |
| Eye specialist consultation                   | No           | 50 | 45.5 |
| Aware of digital eye strain                   | Yes          | 81 | 73.6 |
| Aware of digital eye strain                   | No           | 29 | 26.4 |
| Knows prolonged screen use affects eye health | Yes          | 98 | 89.1 |
| Knows prolonged screen use affects eye health | No           | 12 | 10.9 |
| Knows preventive measures                     | Yes          | 76 | 69.1 |
| Knows preventive measures                     | No           | 34 | 30.9 |
| Previous eye-care education/training          | Yes          | 39 | 35.5 |
| Previous eye-care education/training          | No           | 70 | 63.6 |
| Previous eye-care education/training          | Other        | 1  | 0.9  |

Preventive practices were inconsistent. Only 22.7% reported following the 20-20-20 rule, while 55.5% did not follow it. Artificial tears or eye drops were used regularly by 15.5%, whereas 72.7% did not use them. Screen-brightness adjustment was the most commonly adopted practice, with 96.4% doing so always or sometimes. Appropriate screen distance was maintained by 52.7%. Eye-relaxation exercises were performed by 34.5%, and 45.5% had never consulted an eye specialist.

Awareness was comparatively high: 73.6% had heard of digital eye strain, 89.1% knew that prolonged screen use can affect eye health, and 69.1% knew preventive measures. However, only 35.5% reported previous eye-care education or training. These findings demonstrate a clear difference between general awareness and consistent preventive behavior.

## DISCUSSION

The present study provides a descriptive picture of digital-device exposure, symptoms and self-care among 110 B.Sc. Nursing students. Most participants were aged 19–22 years and the sample was predominantly female, with second-semester students forming the largest academic group. The concentration of participants in early semesters indicates that substantial digital exposure occurs early in nursing education [1,3].

Digital-device exposure was high. More than four-fifths of participants used digital devices for more than two hours daily, and 58.2% reported more than four hours. The smartphone was the main study device for 60.0%. In addition, 76.4% used devices in dark or low-light conditions and 82.7% used them while lying down [13,15]. These findings are consistent with the pattern described in the thesis literature review, in which prolonged exposure, inadequate breaks, poor lighting and suboptimal ergonomics

repeatedly appear as relevant factors associated with digital eye strain [15,16].

The symptom profile was broad. Headache and neck or shoulder pain were the most frequently reported complaints, followed by difficulty focusing, eye strain and burning sensation [17]. The combination of ocular symptoms with neck and shoulder discomfort is compatible with the mixed visual and postural demands of prolonged digital-device use, particularly where smartphones and other handheld devices are used [18,19].

A marked knowledge-practice gap was evident. Although 89.1% knew that prolonged screen use can affect eye health and 73.6% were aware of digital eye strain, only 22.7% regularly followed the 20-20-20 rule. Similarly, 65.5% did not perform eye-relaxation exercises and 72.7% did not use artificial tears or eye drops. The contrast suggests that awareness alone did not consistently translate into routine preventive behavior [20,21].

The findings should be interpreted as descriptive observations within this sample. The study design and self-reported questionnaire do not establish that particular device habits caused the reported symptoms. The thesis also identifies the need for future research using larger samples, multiple institutions, longitudinal designs and objective eye assessment.

## CONCLUSION

Among the B.Sc. Nursing students studied, digital-device exposure was substantial and symptoms commonly associated with digital eye strain were frequently reported. Headache, neck or shoulder pain, difficulty focusing, eye strain and burning sensation were prominent complaints. Although most students recognized that prolonged screen use can affect eye health, regular use of structured preventive practices was comparatively limited. The findings support the incorporation of practical digital eye-health education, break routines, ergonomic guidance and reinforcement of self-care practices within nursing education.

## FUTURE RECOMMENDATIONS

Based on the findings and scope of the present study, the following recommendations are suggested for future research and nursing practice:

Conduct studies with larger sample sizes: Future studies may be conducted among a larger number of nursing students from different universities and nursing colleges to improve the generalizability of the findings.

Use a longitudinal research design: Future researchers may adopt a longitudinal approach to assess changes in digital eye strain over time and examine its relationship with prolonged digital device use.

Conduct interventional studies: Experimental or quasi-experimental studies may be conducted to evaluate the effectiveness of educational programmes, eye exercises, and preventive strategies in reducing digital eye strain among nursing students.

Assess the effectiveness of the 20-20-20 rule: Further studies may evaluate the effectiveness of regular implementation of the 20-20-20 rule in reducing symptoms of digital eye strain among students who use digital devices for prolonged periods.

Incorporate objective assessment methods: Future researchers may combine self-reported symptom assessment with appropriate clinical or optometric examinations to obtain a more comprehensive understanding of digital eye strain.

Develop and evaluate educational programmes: Nursing institutions may introduce structured health education programmes regarding digital eye strain, healthy screen habits, ergonomic practices, and preventive eye care. Future studies may assess the effectiveness of these programmes.

Investigate the relationship with academic activities: Future research may explore how online classes, electronic learning materials, digital examinations, and prolonged academic screen exposure are associated with digital eye strain among nursing students.

Conduct multicentre studies: Similar research may be undertaken in different geographical regions and educational institutions to identify variations in digital eye strain and associated self-care practices among nursing students.

Encourage institutional preventive strategies: Nursing educational institutions may consider incorporating regular awareness sessions, ergonomic guidance, and reminders for appropriate screen breaks into their academic activities. The effectiveness of such institutional strategies may be evaluated through future research.

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