

# Digital Eye Strain: Knowledge, Attitude and Practice Among University Students

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## Abstract

The purpose of this study was to assess the knowledge, attitude, and practice towards digital eye strain (DES) among Northern Border University (NBU) students in Arar city. A total of 389 students from all nine NBU colleges willingly participated in this population-based cross-sectional study. The majority of the participants (65.6%) were in the age group 18-22 and females (76.3%), while 67.6% of the participants belonged to health-related colleges. Around 60% of students were familiar with the terms like DES and computer vision syndrome. More than fifty people (55.5%) had sufficient knowledge about DES. The most commonly used digital devices were iPads (56.6%). A significant difference in the knowledge in relation to the ages, faculty type, and academic year existed. A positive attitude regarding adjustment of brightness, appropriate seating position and viewing distance was demonstrated by 74%, 73.8%, and 81% of participants respectively. Regarding the duration, 61.2% of participants above six hours of total digital exposure per day. The symptoms associated with digital devices were fatigue of the eyes, foreign body sensation, and also non-ocular symptoms like shoulder or neck pain. The commonest source of participants' information about digital eye strain was an awareness campaign.

Sufficient knowledge about DES was demonstrated above half of the studied population. The current study highlights the need to reduce the digital exposure hours among university students and also to strengthen awareness about DES and its methods of prevention with a target to reach out to the community at large.

**Keywords:** Computer vision syndrome, Digital eye strain, Knowledge, Saudi Arabia, University students

## INTRODUCTION

Digital eye strain (DES) which is interchangeably used in the published literature as computer vision syndrome (CVS), encompasses a wide range of ocular and visual symptoms that affects the quality of life, due to prolonged use of computers and digital devices (DD) [1]. DES includes a wide range of ocular symptoms like watering, dryness, itching, redness, and pain in or around the eyes and systemic manifestations such as shoulder pain, back pain, and headache all these symptoms have increased due to the rise in the digital device exposure associated with the COVID-19 lockdown [2]. Besides, e-learning as a method for current teaching and learning in universities and schools has added more to this problem.

Over the past few years, the use of digital devices like computers, laptops, tablets, and smartphones is becoming increasingly popular in all age groups [3, 4]. The risk factors for DES include long digital exposure, inappropriate sitting position or viewing distance, etc [5, 6]. Therefore, maintaining appropriate viewing distance, proper lighting, taking frequent breaks while working on digital screens and use of antiglare screens may help in the prevention of DES. DES is an emerging public health problem and policymakers should come up with strict guidelines now to avoid its adverse impact on the quality of life [7, 8]. A complaint of red eye

could be interpreted in different ways and only a combination of excellent history taking and diligent physical examination could point out the correct diagnosis.

Studies on the knowledge and associated risk factors of DES are important to address the problems related to the improper use of digital devices. Although a few studies of such nature have been conducted in the Kingdom of Saudi Arabia, no data are available from the Northern Border Region [9-11]. Hence, the purpose of the current study was to assess the knowledge,

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attitude, and risk factors among university students in Arar City through a structured questionnaire.

participants belonged to health-related colleges (medical, applied medical, or nursing) **Table 1**.

## MATERIALS AND METHODS

### Study Design

This population-based cross-sectional study was conducted between month April and November 2022, in Arar city on 389 Northern Border University (NBU) students.

### Sampling Method and Study Sample

Random sampling technique. The minimal sample size for the study (384) was calculated according to the equation:

$$\text{Sample size} = \frac{Z_{1-\alpha/2}^2 P(1 - P)}{d^2} \quad (1)$$

Where, ( $Z_{1-\alpha/2}$ ) is the standard normal variate at 5% type 1 error (1.96); (P) is the expected knowledge 50.0%; and (d) is the absolute error (0.05).

### Inclusion and Exclusion Criteria

Male and female students from all nine NBU colleges in Arar who willingly agreed to participate were included. Participants who were currently having any active ocular infection or allergy or had had it in the past six months and those who had a history of chronic blepharitis, chronic headache/migraine, or any dry eye disease due to other causes were excluded.

### Research Tool

The knowledge and attitude were assessed using a predesigned questionnaire validated by the Ophthalmology Department at NBU. The knowledge was assessed through seven questions, the sum of which was calculated as the participant’s overall knowledge score (correct answer = 1, incorrect = 0) and the cut-off point for sufficient or insufficient knowledge was 50%. For the questions pertaining to the symptoms and the source of information, the participants were free to select more than one response.

### Ethical Approval

Ethical approval (No: 31/43/H Dated: 02/03/2022) was obtained from the NBU’s Local Committee of Bioethics.

### Data Analysis

The data were coded and analyzed on SPSS (statistical package for social sciences) version 20 0 (IBM Corporation, Armonk, NY, USA). The effect of the different demographic characteristics on the knowledge scores was analyzed using the Chi-square test and a P-value less than 0.05 was considered significant.

## RESULTS AND DISCUSSION

The majority of the participants (65.6%) were in the age group 18-22 and females (76.3%), while 67.6% of the

**Table 1.** Demographic data

Item	Number	Percent
Age		
18- 22	255	65.6%
23-27	119	30.6%
28 or above	15	3.9%
Gender		
Male	92	23.7%
Female	297	76.3%
College		
Education and Arts	48	12.3%
Business Administration	2	0.5%
Applied Medical Sciences	48	12.3%
Medicine	159	40.9%
Nursing	56	14.4%
Engineering	26	6.7%
Science	20	5.1%
Home Economics	9	2.3%
Arar Community College	21	5.4%
Academic Year		
Preparatory	102	26.2%
First Year	62	15.9%
Second Year	55	14.1%
Third Year	33	8.5%
Fourth Year	50	12.9%
Fifth Year	34	8.7%
Sixth Year	27	6.9%
Internship	26	6.7%

Although only around 60% were familiar with the terms like DES or CVS, 78.1% had correctly pointed out that increased digital exposure can be harmful to the eyes. Similarly, most of the participants agreed that adjustment of brightness, appropriate seating position and viewing distance (74%, 73.8%, and 81% respectively) are important in the case of digital work. Slightly less than half (49.6%) of participants knew about antiglare screens and around sixty percent believed that taking breaks during digital work is useful **Table 2**.

**Table 2. Knowledge about Digital Eye Strain**

Item	Number	Percent
<b>Have you heard about digital eye strain/computer vision syndrome?</b>		
Yes	233	59.9
No	156	40.1
<b>Can overuse of computer/ digital devices harm the eyes?</b>		
Yes	304	78.1
No	28	7.2
Not Sure	57	14.7
<b>Is adjustment of the brightness and contrast of a computer useful?</b>		
Yes	288	74.0
No	32	8.2
Not Sure	69	17.7
<b>Do you know about antiglare screens?</b>		
Yes	193	49.6
No	97	24.9
Not Sure	99	25.4
<b>Is appropriate seating position necessary during digital device use?</b>		
Yes	287	73.8
No	33	8.5
Not Sure	69	17.7
<b>Is maintaining proper distance from digital device is important?</b>		
Yes	315	81.0
No	22	5.7
Not Sure	52	13.4
<b>Is taking breaks in between the computer/digital work important?</b>		
Yes	233	59.9
No	38	9.8
Not Sure	118	30.3

There was no significant difference in knowledge between males and females (P value 0.156), but this difference was significant when ages, faculty type, and academic year were considered (P values 0.034, 0.048, and 0.001 respectively) **Table 3.**

**Table 3. Knowledge level in relation to personal characteristics**

	Knowledge Level				P value
	Sufficient (number)	Percent	Insufficient (number)	Percent	
<b>Gender</b>					
Male	57	62.0	35	38.0	<b>0.156</b>

Female	159	53.5	138	46.5	
<b>Age</b>					
18-22 years	80	49.0	84	51.0	<b>0.034</b>
23 and above	134	60.0	91	40	
<b>Faculty type</b>					
Health Sciences	159	60.3	105	39.7	<b>0.048</b>
Others	62	49.6	63	50.4	
<b>Academic year</b>					
Preparatory to 2 <sup>nd</sup> . Year	76	46.0	88	54.0	<b>0.001</b>
3 <sup>rd</sup> . Year and above	134	60.0	91	40.0	

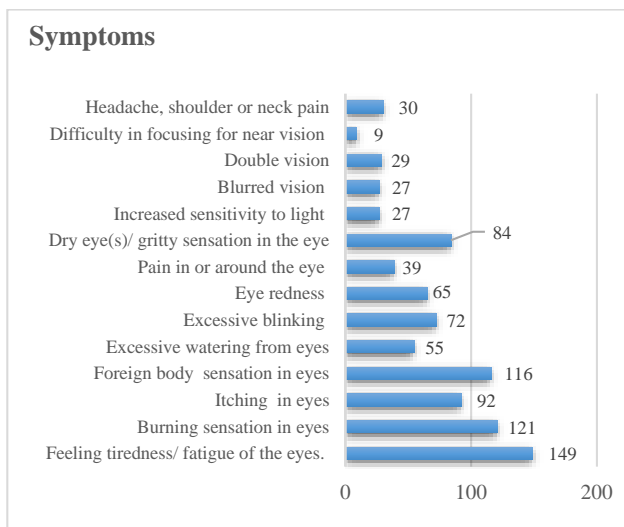
More than half of the participants (56.6%) used tablets or iPad for their studies and only 34.2% opted to adjust the brightness of the screen. Around 60% of participants maintained proper viewing distance and 58.6% appropriate level of the devices. Although 41.1% of participants spent less than three hours per day on DD for their studies, 61.2% spent in total more than six hours per day including other activities like social media or video gaming. The majority of the participants 76.1% had been using the DD for more than five years. Upon encountering problems due to DD use 46.8% opted to stop using the device immediately while 43.2% preferred to consult an eye specialist **Table 4.**

**Table 4. Attitude and practice towards Digital Device Use**

Item	Number	Percent
<b>Which device do you use?</b>		
Computer/Desktop	16	4.1%
Laptop	24	6.2%
Smartphone	37	9.5%
Tablet/ I-pad	220	56.6%
Multiple devices	92	23.7%
<b>Do you apply any of these?</b>		
Antiglare screen	16	4.1
Adjustment of brightness	133	34.2
Breaks during digital use	43	11.1
None	197	50.6
<b>What distance do you maintain from your device?</b>		
> 20 inches	111	28.5%
20-25 inches	233	59.9%
> 25 inches	45	11.6%
<b>What is level of the top of the screen from your eyes?</b>		
At the eye level	139	35.7
Below the eye level	228	58.6

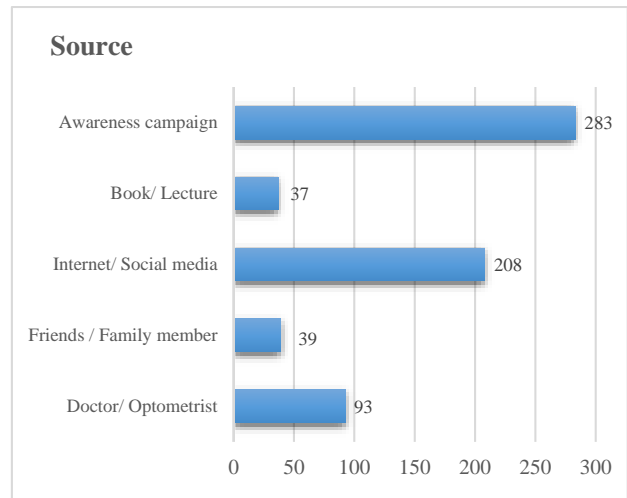
Above the eye level	22	5.7
<b>How many hours per day do you spent on digital devices for studies?</b>		
< 3 h/day	160	41.1
3-6 h/day	148	38.0
>6 h/day	81	20.8
<b>Do you take frequent breaks during computer/digital work?</b>		
Yes	231	59.4
No	158	40.6
<b>How many total hours daily do you spent on digital devices including other activities like social media/ video gaming?</b>		
< 1 h/day	49	12.6
3-6 h/day	101	26.0
>6 h/day	238	61.2
<b>How many total years you have been using digital devices?</b>		
< 3 years	31	8.0
3-5 years	62	15.9
>5 years	296	76.1
<b>If you have problems due to digital devices usage, what do you do?</b>		
Stop using device	182	46.8
Self-medication	39	10.0
Consult Ophthalmologist	168	43.2

The most common symptoms associated with DD as reported by the participants was the fatigue of the eyes followed by foreign body sensation in the eyes **Figure 1**.



**Figure 1.** Symptoms associated with Digital Device Use

The commonest source of participants' information about digital eye strain was an awareness campaign followed by the internet **Figure 2**.



**Figure 2.** Participants' Source of information about DES

More than fifty percent (55.5%) participants had sufficient knowledge about DES. In the current study, the commonly used DD were iPads (56.6%) while only 9.5% used smartphones. On contrary to this, the university students in a nearby country Jordan mobile phones were used by 71% and iPads only 4% [5]. These differences may be related to the availability and/or affordability of the devices in different countries.

The studied participants had shown a significant difference in their knowledge when ages, faculty type, and academic year (P values 0.034, 0.048, and 0.001 respectively) were considered. This is self-explanatory as the students in higher academic years and health sciences are expected to have more knowledge as compared to those in lower academic years and non-health-related faculties.

In the current study, adjustment of brightness, appropriate seating position, and viewing distance was correctly opted for by 74%, 73.8%, and 81% of participants respectively. Similarly, around sixty percent were practicing taking breaks during digital work. This demonstrates a good attitude among university students towards DD use and could be the result of reliable information acquired from the awareness campaigns. Although, 49.6% of participants knew about antiglare screens, in practice only four percent of participants were keen to use them.

Regarding the duration of digital exposure, 61.2% of participants had more than six hours of total digital exposure per day. Daily digital exposure varies in different countries like Saudi Arabia [9, 10], Nepal [12], Sri Lanka [13], and Lebanon [14]. These differences could be attributed to the demand for daily working/ study hours and also to the extra

time spent on activities like social media or video gaming by the studied populations.

Our participants' most frequently reported symptoms were fatigue of the eyes, foreign body sensation, and dryness in the eyes and some had also mentioned non-ocular symptoms like head shoulder, and neck pain. Similarly different ocular and non-ocular symptoms have been reported in studies in Saudi Arabia and abroad [9, 11, 15, 16]. The symptoms may be related to the duration of digital exposure and also to the users' attitude toward DD use. Besides, the exclusion of the preexisting conditions that could cause symptoms similar to DES, might have led to a such pattern of symptoms in the current study.

## CONCLUSION

Sufficient knowledge about DES was demonstrated by more than half of the studied population. Although the participants had shown a positive attitude towards DD, a lack of the application of antiglare screens was observed. The awareness about DES and its methods of prevention needs to be strengthened more with a target to reach out to the population at large. The current study highlights the need to reduce digital exposure hours among university students.

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