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Original Research Article

Ocular and systemic symptoms in digital devices users: A comparative study between pre and post COVID era

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ABSTRACT

Background: Use of digital devices like mobiles, tablets, laptops had increased with the advancement of time and technology as well as during COVID-19 pandemic. These digital devices have tendency to cause number of visual, ocular and systemic symptoms. The purpose of this study was to find the association between various ocular, visual and systemic symptoms with the duration of using digital devices.
Materials and Methods: An online Google questionnaire consisting of demographic information and pre tested questionnaires of symptoms related was distributed using social platforms. The responses were analysed using different statistical tests that included one way ANOVA, pearson Correlation and paired t-test. Statistical significance was considered if $P < 0.05$.
Results: During lockdown, most of the participants were using the digital devices for more than 6 hours daily (68%). 88 (40%) of the respondents were using two digital devices and 24 respondents (10.9%) were using more than two digital devices during lockdown. Ocular symptoms including watering of eyes ($P = 0.002$), dry eyes ($P = 0.006$) and painful eyes ($P = 0.011$) showed positive correlation with hours of using digital devices during lockdown. Similarly, neck pain ($P = 0.000$) and shoulder pain ($P = 0.009$) were the major systemic symptoms associated with increasing hour of digital devices use.
Conclusion: Increasing exposure to the multiple digital devices have negative impact on ocular and systemic symptoms.

1. Introduction

With the advancement of time and technology, the use of digital devices like mobiles, tablets, laptops has been increased in past few years.[1] This digital devices required to be kept at near or intermediate distances for performing any task, thereby causing strain on visual system. With the reference to the guidelines of World Health Organization (WHO), nationwide lockdown was implemented by Indian Government as preventive measure by restricting people's movement due to increase in number of COVID-19 cases.[2] According to American Optometric Association (AOA), eye and vision related problem can arise with minimum two hours of continuous using of digital devices.[3] Apart from ocular and visual symptoms, systemic symptoms such as shoulder pain, neck pain and wrist pain was also prevalent in digital devices user.[4,5] Due to closure of educational institute from March 2020 in view of novel coronavirus disease (COVID 19) pandemic, the traditional teaching method using blackboard/whiteboard has changed to online classroom.[6] In a study, the online classroom was also found to be most effective as traditional classroom.[7] Similarly, another study[8] also concluded that the use of digital devices was more frequent in pandemic era during lockdown in children.

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Taking above facts into consideration, this study aims to find the various ocular, visual and systemic symptoms associated with the duration of using digital devices before and during lockdown

2. Materials and Methods

A questionnaire based cross-sectional study was carried among 220 individuals between 20-25 years of age. Individuals having past ocular history of retinal pathology, Contact lens uses, Glaucoma were excluded from the study. An online survey was designed using Google forms that consist of four sections: demographic information of respondents, information about digital devices followed by pretested questionnaire[9] consisting of questions related to ocular and systemic symptoms. The questionnaire was distributed on social platforms (whatsApp, facebook, Instagram) among targeted individuals. Participants were given short idea about the aim of the study in the questionnaire form along with the consent statement and confidentiality assurance.

The data collected from the respondents were exported from Google form in to excel form. The respondent were divided into groups depending on hours of using digital devices (0-2 hours, 2-4 hours, 4-6 hours, > 6 hours), number of digital devices used (one devices, two devices and more than two devices) for further analysis.

2.1. Statistical analysis

Statistical analysis was performed using SPSS software (IBM SPSS, version 25; IBM Corp., Armonk, NY, USA). Descriptive analysis was done to summarize the result in mean and Standard deviation. One way analysis of Variance (ANOVA) was performed to find the differences between the mean symptoms score with the hours of using digital devices during lockdown with significant value of $P < 0.05$. Similarly, Paired t-test was conducted to compare the mean symptoms score before and during lockdown. The association between mean symptom scores with the duration and number of digital devices used were analysed by using Pearson's correlation test with significance level of $P < 0.05$.

3. Results

A total number of 220 responses were recorded for analysis. The response rate noted was 62.85% (220 responses out of 350 questionnaire sent). The ratio between male and female were 0.41:1. The descriptive statistics is represented in Table 1. 108 respondent were using one digital devices, 88 were using two digital devices and 24 were using more than 2 digital devices (Figure 1).

The individual using digital devices for more than 6 hours per day showed marked increase in ocular symptoms including watering eyes, dry eyes and painful eyes, which were statistically significant during lockdown with P value

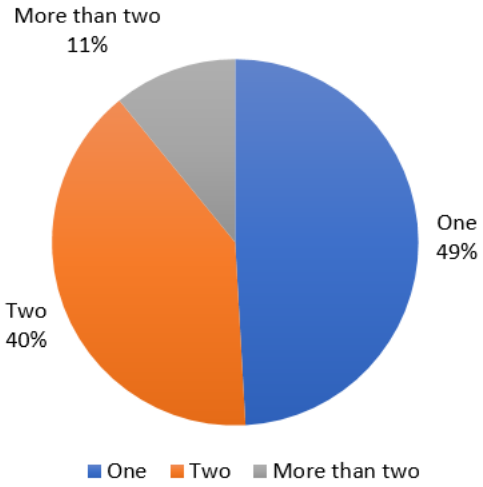

Fig. 1: Percentage of number of digital devices used during lockdown

Table 1: Descriptive analysis

Parameters	**Particulars**
Age [Mean ± SD]	21.98 ± 2.407 years
Gender [n (%)]	
Male	64 (29.1%)
Female	156 (70.9%)
Occupation [n (%)]	
Students	184 (83.6%)
Practitioner	20 (9.1%)
Faculty	6 (2.7%)
Entrepreneur	10 (4.5%)
Hours of using digital devices [n (%)]	
Before lockdown	
0-2 hours	54 (24.5%)
2-4 hours	100 (45.5%)
4-6 hours	40 (18.2%)
>6 hours	26 (11.8%)
During lockdown	
0-2 hours	18 (8.2%)
2-4 hours	58 (26.4%)
4-6 hours	76 (34.5%)
>6 hours	68 (30.9%)
Number of digital devices used [n (%)]	
One	108 (49.1%)
Two	88 (40.0%)
More than two	24 (10.9%)

Table 2: Comparison between symptom scores with hours of digital devices used during lockdown

	Hours of digital devices used per day	n	Mean ± SD	F	P-value
Watering eyes	0-2 hours	18	1 ± 0.00	3.532	.017
	2-4 hours	58	1.28 ± 0.45		
	4-6 hours	76	1.37 ± 0.48		
	>6 hours	68	1.56 ± 0.61		
Itching eyes	0-2 hours	18	1.11 ± 0.33	1.974	.122
	2-4 hours	58	1.34 ± 0.48		
	4-6 hours	76	1.55 ± 0.64		
	>6 hours	68	1.47 ± 0.50		
Red eyes	0-2 hours	18	1.33 ± 0.50	0.442	.723
	2-4 hours	58	1.17 ± 0.38		
	4-6 hours	76	1.18 ± 0.39		
	>6 hours	68	1.24 ± 0.43		
Dry eyes	0-2 hours	18	1.33 ± 0.70	3.775	.013
	2-4 hours	58	1.10 ± 0.31		
	4-6 hours	76	1.45 ± 0.68		
	>6 hours	68	1.62 ± 0.69		
Painful eyes	0-2 hours	18	1.11 ± 0.33	2.713	.049
	2-4 hours	58	1.31 ± 0.47		
	4-6 hours	76	1.32 ± 0.52		
	>6 hours	68	1.59 ± 0.65		
Blurring of vision	0-2 hours	18	1.22 ± 0.44	3.065	.031
	2-4 hours	58	1.21 ± 0.41		
	4-6 hours	76	1.29 ± 0.56		
	>6 hours	68	1.59 ± 0.65		
Double vision	0-2 hours	18	1.00 ± 0.00	0.428	.734
	2-4 hours	58	1.10 ± 0.31		
	4-6 hours	76	1.08 ± 0.27		
	>6 hours	68	1.12 ± 0.32		
Shoulder pain	0-2 hours	18	1.44 ± 0.52	3.019	.033
	2-4 hours	58	1.45 ± 0.50		
	4-6 hours	76	1.53 ± 0.64		
	>6 hours	68	1.88 ± 0.76		
Neck pain	0-2 hours	18	1.33 ± 0.50	6.803	.000
	2-4 hours	58	1.24 ± 0.43		
	4-6 hours	76	1.58 ± 0.59		
	>6 hours	68	1.88 ± 0.68		
Back pain	0-2 hours	18	1.33 ± 0.50	2.208	.091
	2-4 hours	58	1.55 ± 0.63		
	4-6 hours	76	1.61 ± 0.67		
	>6 hours	68	1.85 ± 0.61		
Headache	0-2 hours	18	1.67 ± 0.70	2.197	.093
	2-4 hours	58	1.55 ± 0.57		
	4-6 hours	76	1.89 ± 0.55		
	>6 hours	68	1.85 ± 0.61		

Table 3: Comparison between mean symptoms score before and during lockdown

	Mean value		t - value	P-value
	Before lockdown	During lockdown		
Watering eyes	1.31	1.38	-2.145	0.034
Itching eyes	1.41	1.44	-0.773	0.441
Red eyes	1.25	1.21	1.156	0.250
Dry eyes	1.37	1.40	-0.773	0.441
Painful eyes	1.32	1.38	-1.352	0.179
Blurring of vision	1.32	1.35	-1.156	0.250
Double vision	1.09	1.09	0.000	1.000
Shoulder pain	1.59	1.61	-0.407	0.685
Neck pain	1.61	1.56	1.043	0.299
Back pain	1.60	1.65	-1.295	0.198
Headache	1.78	1.77	0.228	0.820

less than 0.05. Similarly, Visual symptoms score that includes blurring of vision was statistically significant (P = 0.031) during lockdown. Regarding musculoskeletal symptoms, neck pain and shoulder pain during lockdown were found to have statistically significant differences with P value less than 0.05 (Table 2).

While comparing with the symptoms score of the individual before lockdown with the symptoms score during lockdown, only one ocular symptom i.e watering eye (P = 0.034) was found to have statistical significant differences (Table 3).

Positive correlation was established between symptoms score consisting watery eyes (r = 0.294, P = 0.002), painful eyes (r = 0.243, P = 0.011), dry eyes (r = 0.261, P = 0.006), neck pain (r = 0.376, P = 0.000) and shoulder pain (r = 0.247, P = 0.009) and hour of using digital devices during lockdown. Similarly, there was positive correlation between number of digital devices used and the symptoms scores that includes blurring of vision(r = 0.188, P = 0.049), neck pain (r = 0.381, P = 0.000), shoulder pain (r = 0.277, P = 0.003), headache (r = 0.236, P = 0.013) and back pain (r = 0.213, P = 0.026).

4. Discussion

Several literatures observed that the use of digital devices is most frequent in young age population during lockdown for various purposes.[8–10] Mohan et al[11] found that the hour spent on digital devices increased during lockdown period as compared with pre-COVID era. Similarly, Gauri et al[9] and Mohan et al[11] also observed that young population spent more than 6 hours/day on digital devices cause headache. A similar pattern was observed in the present study with respondents using more than 6 hours on digital devices during lockdown as compared with pre-lockdown situation.

In a study, the male respondents was found to have greater impact on digital devices use.[11] The result in our study showed that the maximum number of female respondents used digital devices but this findings can be due to minimal participation of male respondents.

Smartphones/mobiles continued to be the most used digital devices among population[11–14] of different ages before COVID era and during COVID era which was also observed in the present study. Apart from mobiles, this study also noticed that more than half of respondents used two and/or more than two digital devices that includes laptops, tablets.

In a study,[15] there was positive association of dry eye symptoms and vision fluctuation with increasing hours of digital devices use. A similar observation was seen in our study where watering eyes, dry eyes and blurring of vision were found statistically significant with increasing hours of using the digital devices. Moreover, red eyes was also found to have more frequent and common symptoms in prolong hour of using digital devices in past study.[10,11,16,17] Though this question was included in our study, we did not find any statistically significant differences for this symptoms.

Musculoskeletal symptoms including shoulder pain, back pain, headache and neck pain was found to be more frequent in the individual who spent more hours on digital devices.[17,18] Similar finding was noted in our study except for headache and back pain.

Several studies have concluded that headache and itching were the most common experienced symptoms found in population with higher amount of digital devices use during lockdown.[3,9,11] The present study found that headache, neck pain and back pain were the most common and positively associated symptoms with increased number of digital devices use during lockdown. Similarly, Iwariki et al[17] found positive association between neck pain and multiple digital devices. The similar finding reflects in our study where the neck pain was found to be the highly associated systemic symptoms with number of digital devices use.

5. Conclusion

Respondents spent maximum hours on digital devices during lockdown as compared to pre-lockdown situations. Mobiles were the most used digital devices during

lockdown. More than fifty percent of respondents used two and/or more than two digital devices. Ocular symptoms like watering eyes, dry eyes, and painful eyes were found to be most common symptoms in digital devices users. Similarly, systemic symptoms like neck pain and shoulder pain were found to be most common complaints. The ocular, visual and systemic symptoms were found to get significantly aggravated during lockdown which indicates that proper education and preventive measures need to be taken on the frequency and number of using digital devices.

6. Source of Funding

None.

7. Conflict of Interest

None.

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