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OCULAR COMPLAINTS DURING COVID-19 LOCKDOWN AMONGST PRIVATE UNIVERSITY STUDENTS IN SELANGOR, MALAYSIA

Ophthalmology

Hesham Shebl	International Medical School (IMS), Management and Science University (MSU), University Drive, Off Persiaran Olahraga, Shah Alam, 40400, Malaysia.
Mohammed Faez Baobaid*	International Medical School (IMS), Management and Science University (MSU), University Drive, Off Persiaran Olahraga, Shah Alam, 40400, Malaysia. *Corresponding Author
Lee Wei	International Medical School (IMS), Management and Science University (MSU), University Drive, Off Persiaran Olahraga, Shah Alam, 40400, Malaysia.
Nihal Ahmed Hanafy	International Medical School (IMS), Management and Science University (MSU), University Drive, Off Persiaran Olahraga, Shah Alam, 40400, Malaysia.
Hassan Omar Ads	International Medical School (IMS), Management and Science University (MSU), University Drive, Off Persiaran Olahraga, Shah Alam, 40400, Malaysia.

ABSTRACT

Aim: COVID-19 lockdown has led to the emerging concept of studying from home. Research has shown that increased near visual work causes dry eye complaints. This study aims to determine the association between electronic device usage during the COVID-19 lockdown and ocular complaints among university students. **Methods:** Through convenience sampling, the 544 responses to an online survey were distributed to private university students in Selangor, Malaysia. **Results:** Analysis of the responses demonstrated a dramatic increase in the percentage of students who spent 5 hours and more on an electronic device from 44.8% before the lockdown to 94.1% during the lockdown. 83.3% of the participating students had symptoms of dry eye disease, and 54.1% were graded as severe. There was a statistically significant association between age groups, race, and taking breaks between electronic device usage, room illumination, and OSDI severity. **Conclusion:** The results indicate that lockdown does have an impact on dry eye symptoms. On this basis, frequent breaks in between continuous usage of electronic devices should be cultivated. Further research with a larger sample size is needed to identify the association between the sociodemographic factors, electronic device usage-related factors, and the severity of dry eye symptoms.

KEYWORDS

Dry eye, COVID-19, student, screen time, cross-sectional studies

INTRODUCTION

SARS-COV-2, also known as COVID-19, is a highly contagious novel Coronavirus disease affecting the entire world. Wuhan, China, has reported the first case of pneumonia caused by the SARS-COV-2 virus. It then spread to Thailand, the USA, Australia, France, Germany, Italy, and eventually to the world (Giovanetti et al., 2020). Since the SARS-COV-2 virus is transmitted through droplets, Malaysia has been under a movement control order (MCO) since 18 March 2020 to contain the virus by minimizing human-to-human transmission (NST, 2020).

After almost one and a half years of lockdown, on 28 August 2021, Malaysia still had 22597 reported cases and 252 deaths (Kementerian Kesihatan Malaysia, 2021). As the number of cases increases, people worry about the consequences of this enduring lockdown. Moreover, the lockdown has not only caused emerging mental health problems (Tianchen et al., 2020; Wang et al., 2021), but it also affected people physically, mainly due to changes in eating behaviors, poor nutrition, decreased physical activity, and a sedentary lifestyle (Kriaucioniene et al., 2020).

Students are a group of people who were adversely affected as all public and higher education institutions nationwide must close. University students are forbidden to travel to campus, and online classes and video assignments are the primary teaching tools. As a result, near-vision work will likely be prolonged. Based on Reshma BKS & Iram S. (2020), 63.63% of computer users who work on computer screens for >8 hours per day have dry eyes.

TFOS DEWS II defines *dry eye* as: "a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms which are caused by tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities," (Craig et al., 2017). Although the disease cannot be diagnosed by taking a history alone, questionnaires such as the Impact of Dry Eye on Everyday Life (IDEEL) or Ocular Surface Disease Index (OSDI) play an essential role in screening and history taking prior to exhaustive investigations such as tear film meniscus, tear film break-up time and Schirmer test (Messmer, 2015).

Herein, we study the association between electronic device usage during the COVID-19 lockdown and ocular complaints among private university students in Shah Alam. We hope that this study will shed light on the consequences of prolonged screen usage and, as a result, recommend measures to improve eye health.

METHODOLOGY

A cross-sectional study was conducted to assess the ocular complaints related to COVID-19 quarantine among private university students in Shah Alam, Malaysia. It was conducted from August to December 2021 on five hundred and forty-four students who responded to questionnaires. Convenience sampling was used to obtain the sampled population. In addition, a self-administered questionnaire was distributed to batch leaders from various faculties and universities. The questionnaire consists of three main sections: section A (social demographic factors and ocular condition: age, gender, ethnicity, educational status, ocular disease, usage of eyeglasses, method of learning)**,** section B (Electronic device usage: hours of use, taking breaks in between, the distance between the eyes and the screen, room illumination, presence of air-conditioner and fan in the room, and awareness of the 20/20/20 rule) and section C (Ocular Surface Disease Index (OSDI) questionnaire).

The questions regarding the risk factors associated with electronic devices were extracted from previous research by Al Tawil et al. (2020). As our study was related to an increased usage of screens or electronic devices during the lockdown, only the questions related to screening usage and awareness of proper computer use were selected.

The main questionnaire used was the Ocular Surface Disease Index (OSDI) (Walt JG, Rowe MM, 1997). Respondents were asked to answer on a five-point scale ranging from "none of the time/ no points" to "all of the time/ four points." The total score calculated from the formula of [(sum of scores for all questions answered) x 100] / [(total number of questions answered) x 4] ranges from 0 to 100 points. The severity is graded as normal (0-12 points), mild (13-22 points), moderate (23-32 points), or severe (33-100 points). According to Okumura et al. (2020), this questionnaire has only 12 questions; hence, it is relatively more manageable and less overwhelming for

respondents. There is a limitation, however, in that it does not cover all dry eye symptoms and health-related quality of life.

Nevertheless, this questionnaire displays high consistency, excellent validity, sound sensitivity, and specificity, proven in previous research with 109 patients with dry eye disease and 30 control subjects (Schiffman et al., 2000). Additionally, it was beneficial for identifying mild, moderate, and severe cases of dry eye disease diagnosed and graded by physicians. It also effectively distinguished between control subjects and patients with dry eye disease.

The Statistical Package for the Social Sciences (SPSS) 23.0 was used to analyze the respondents' data. The Ethics Committee of Management and Science University approved the study. Before taking part in the online survey, respondents provided informed consent.

RESULTS

Studying the association between electronic devices used during the COVID-19 lockdown and OSDI severity among students at private universities in Shah Alam is the main objective of this study. Additionally, we studied the association between OSDI severity and sociodemographic factors, including gender, ethnicity, age group, educational level, eye medication use, eyeglasses, and learning method during the lockdown.

Most respondents were aged 18-22 (55.2%). The respondents were mostly females (81.5%). Regarding ethnicity, Malays had the highest number (48.9%), followed by Indians (32.6%), Chinese (10.7%), and others (7.8%). Most of the participating students were degree holders (66.7%). 98.9% of them did not use any eye medication. 63.7% of the respondents were wearing eyeglasses. 57.4% of the respondents had online learning. **Frequency distribution of Socio-demographic factors (Table 1)**

During the COVID-19 lockdown, there was a dramatic increase in the percentage of students who spent 5 hours and more on the electronic device from 44.8% to 94.1%. Most respondents were aware of the 20/20/20 rule (54.8%). On the other hand, most of them took breaks between using electronic devices (65.6%). In addition, 53.7% of them kept a distance less than 40cm from the screen. Regarding room illumination, 61.1% used electronic devices in average-illuminated rooms. 45.6% of the respondents had both air-conditioners and fans in their rooms where they used electronic devices. **Frequency distribution of electronic devices usage-related factors (Table 2)**

83.3% of the participating students had symptoms of dry eye disease, according to the OSDI questionnaire. Amongst them, 54.1% were graded as severe. **Frequency distribution of severity of dry eye symptoms according to OSDI score (Table 2)**

There was a significant association between age and OSDI severity (p-value=0.012). There was a significant association between race and OSDI severity (p-value=0.000). There was a significant association between taking breaks in between electronic device usage and OSDI severity (p-value=0.018). There was an association between room illumination and OSDI severity (p-value=0.000). **Analyses of categorical variables (Table 3 and Table 4)**

DISCUSSION

In this study, it was found that 83.3% of the participants presented with ocular surface disease symptoms, and most of them (54.1%) had severe symptoms (OSDI >33). The other studies reported lower prevalence which 70.4%, 78%, and 50.5% of participants in one of the universities in Mexico (Garza-León et al., 2016) and two different universities in Korea (Choi et al., 2018; Yun et al. 2012) had scored more than 12 after answering the OSDI questionnaire, respectively.

On the other hand, Rahman & Sanip (2011) showed that 68.1% of respondents from a public university in central Peninsular Malaysia had computer vision syndrome. On the contrary, amongst the general population, including but not limited to university students, both Malaysian studies have shown that only 14.6% and 14.4% of the participants had dry eye disease symptoms (Jamaliah & Fathilah, 2002; Mohd-Ali et al., 2011). Comparison of our findings with the prior studies should be made meticulously, as our study was done amid the COVID-19 lockdown when e-learning was the main method of education.

According to Kaur et al. (2020), online e-learning is equally beneficial as classroom learning. However, online e-learning has indisputably increased digital screen time. In the other part of the world, a study has shown that almost 70% of European children exceeded the recommended 2 hours/ day of total screen time on weekdays (Kovacs et al., 2021) during COVID-19 lockdown, which was consistent with the present study. Moreover, there was an increase in total screen time of 1730 minutes/per week after the COVID-19 pandemic among children and adolescents in China (Xiang et al., 2020).

Aging is a known aetiological factor disrupting the tear film's homeostasis (Craig et al., 2017). In addition, a previous study done at University Malaya Medical Centre reported similar findings in which there were statistically significant differences between age groups (p-value<0.01) (Jamaliah & Fathilah, 2002).

Good awareness regarding safe computer use is essential in preventing ocular symptoms. Those who understand the 20/20/20 rule had less prevalence of severe dry eye symptoms despite not being statistically significant (p-value=0.844). A previous study reported statistically significant symptoms of eyestrain and burning of eyes presented in participants who did not take breaks during computer use (Agarwal et al., 2013), which was consistent with the present study. Moreover, the closer the distance between the eyes and the computer screen, the more complex the eyes operate. This excess accommodation can reduce the blinking rate, leading to the manifestation of dry eye (Akinbinu & Mashalla, 2014). Furthermore, adequate room illumination and avoiding working in the dark are essential in preventing dry eye and eye-related problems (Mallik et al., 2017).

The present study has shown a dramatic increase in hours spent on electronic devices during the COVID-19 lockdown and the severity of OSDI scores in university students. However, future research is required, and it should be done with a larger sample size. In addition, a face-to-face interview is recommended for better clarification as some dry eye symptoms are ambiguous, and the participants may not understand the meaning of the symptoms.

CONCLUSION

Increased screen time during the COVID-19 lockdown is inevitable. However, it has affected students' vision negatively. Dry eye symptoms are commonly experienced by university students who look at electronic devices for an extended period, especially during this COVID-19 lockdown, with severe symptoms. Therefore, all students should cultivate an awareness of appropriate screen practices. The authority should also limit the duration of online classes and encourage short breaks during continuous computer work.

1. Appendix

Table 1: Frequency distribution of Socio-demographic factors

Variable		Frequency	Percent (%)
Age	>28	14	2.6
	23-28	228	42.2
	18-22	298	55.2
Gender	Female	440	81.5
	Male	100	18.5
Race	Malay	264	48.9
	Indian	176	32.6
	Chinese	58	10.7
	Others	42	7.8
Level of education	Degree	360	66.7
	Diploma	116	21.5
	Foundation	54	10.0
	Master	8	1.5
	PhD	2	0.4
Usage of eye medication	No	534	98.9
	Yes	6	1.1
Usage of eyeglasses	No	196	36.3
	Yes	344	63.7
Method of learning	Both	222	41.1
	Classroom learning	8	1.5
	Online learning	310	57.4

Table 2: Frequency distribution of electronic devices usage-related factors and Frequency distribution of severity of dry eye symptoms according to OSDI questionnaire

Frequency distribution of electronic devices usage-related factors			
Variable		Frequency	Percent (%)
Hours of usage during COVID-19	< 5 hours	32	5.9
	≥ 5 hours	508	94.1
Hours of usage before COVID-19	< 5 hours	298	55.2
	≥ 5 hours	242	44.8
Awareness of the 20/20/20 rule	No	296	54.8
	Yes	244	45.2
Taking breaks in between	No	186	34.4
	Yes	354	65.6
Distance between the eyes and the screen	Between 40 and 76cm (about an arm's length away)	236	43.7
	Less than 40cm (less than an arm's length away)	290	53.7
	More than 76cm (more than an arm's length away)	14	2.6
Room illumination	Average	330	61.1
	Bright	158	29.3
	Dull	52	9.6
Presence of air-conditioner, fan or both	Air-conditioner	80	14.8
	Fan	208	38.5
	All the above	246	45.6
	None of the above	6	1.1
Frequency distribution of severity of dry eye symptoms according to OSDI questionnaire			
Variable		Frequency	Percent (%)
Severity of dry eye symptoms according to OSDI questionnaire	Normal	90	16.7
	Mild	82	15.2
	Moderate	76	14.1
	Severe	292	54.1

Table 3: Association between sociodemographic factors and OSDI severity.

Variable		OSDI Severity				P -value
		Normal	Mild	Moderate	Severe	
Age	18-28	90 (17.1%)	80 (15.2%)	76 (14.4%)	280 (53.2%)	0.012
	>28	0 (0.0%)	2 (14.3%)	0 (0.0%)	12 (85.7%)	
Gender	Female	70 (15.9%)	62 (14.1%)	62 (14.1%)	246 (55.9%)	0.243
Race	Male	20 (20.0%)	20 (20.0%)	14 (14.0%)	46 (46.0%)	
	Malay	16 (12.1%)	19 (14.4%)	21 (15.9%)	76 (57.6%)	0. 000
	Chinese	6 (10.3%)	4 (6.9%)	14 (24.1%)	34 (58.6%)	
	Indian	46 (26.1%)	28 (15.9%)	14 (8.0%)	88 (50.0%)	
	Others	6 (14.3%)	12 (28.6%)	6 (14.3%)	18 (42.9%)	
Level of education	Foundation, Diploma	26 (15.3%)	22 (12.9%)	28 (16.5%)	94 (55.3%)	0.541
	Degree	62 (17.2%)	58 (16.1%)	48 (13.3%)	192 (53.3%)	
	Master, PhD	2 (20.0%)	2 (20.0%)	0 (0.0%)	6 (60.0%)	
Eye condition	No	88 (16.5%)	82 (15.4%)	76 (14.2%)	288 (53.9%)	0.214
	Yes	2 (33.3%)	0 (0.0%)	0 (0.0%)	4 (66.7%)	
Usage of eyeglasses	No	40 (20.4%)	30 (15.3%)	28 (14.3%)	98 (50.0%)	0.315
	Yes	50 (14.5%)	52 (15.1%)	48 (14.0%)	194 (56.4%)	
Method of education	Online learning	88 (16.5%)	80 (15.0%)	74 (13.9%)	290 (54.5%)	0.412
	Classroom learning and hybrid learning	2 (25.0%)	2 (25.0%)	2 (25.0%)	2 (25.0%)	

Table 4: Association between electronic devices usage-related factors and OSDI severity.

Variable		OSDI Severity				P-value
		Normal	Mild	Moderate	Severe	
Hours of usage during COVID-19	< 5 hours	4 (12.5%)	2 (6.3%)	4 (12.5%)	22 (68.8%)	0.313
	≥ 5 hours	86 (16.9%)	80 (15.7%)	72 (14.2%)	270 (53.1%)	
Hours of usage before COVID-19	< 5 hours	48 (16.1%)	46 (15.4%)	34 (11.4%)	170 (57.0%)	0.206
	≥ 5 hours	42 (17.4%)	36 (14.9%)	42 (17.4%)	122 (50.4%)	
Awareness of the 20/20/20 rule	No	50 (16.9%)	42 (14.2%)	38 (12.8%)	166 (56.1%)	0.650
	Yes	40 (16.4%)	40 (16.4%)	38 (15.6%)	126 (51.6%)	
Taking breaks in between	No	18 (9.7%)	30 (16.1%)	28 (15.1%)	110 (59.1%)	0.018
	Yes	72 (20.3%)	52 (14.7%)	48 (13.6%)	182 (51.4%)	
Distance between the eyes and the screen	Less than 40cm	42 (14.5%)	42 (14.5%)	40 (13.8%)	166 (57.2%)	0.363
	More than 40cm	48 (19.2%)	40 (16.0%)	36 (14.4%)	126 (50.4%)	
Room illumination	Average	36 (10.9%)	52 (15.8%)	52 (15.8%)	190 (57.6%)	0.000
	Bright	46 (29.1%)	22 (13.9%)	18 (11.4%)	72 (45.6%)	
	Dull	8 (15.4%)	8 (15.4%)	6 (11.5%)	30 (57.7%)	
Presence of air conditioner, fan or both	Yes	90 (16.9%)	80 (15.0%)	76 (14.2%)	288 (53.9%)	0.183
	No	0 (0.0%)	2 (33.3%)	0 (0.0%)	4 (66.7%)	

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