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The Effect Of Gadget Usage With Digital Eye Strain (Des) In Students Of The Medical Faculty Muhammadiyah University Of Malang During The Covid-19 Pandemic

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ABSTRACT

Introduction: COVID-19 pandemic have cause most people to work from home and spend more time on screens including the students of Medical Faculty Muhammadiyah University of Malang. Digital Eye Strain (DES) is a collection of symptomssuch as (1). Ocular which include dry eyes, watering, eye irritation, (2). Asthenopia which includes eye fatigue, eye strain, eye pain, (3). Visuals such as double vision, difficulty changing focus, blurred vision and (4). Extraocular symptoms include back, neck and headache pain. The use of computers and digital screens for more than 3 hours will put people at risk of experiencing DES.

Purpose: To determine the relationship between the duration of the use of gadgets with the complaints related to DES in the students of Faculty of Medicine, University of Muhammadiyah Malang.

Result: 79 respondents with the most of age were 17-20 years old were participated in this study. There is an insignificant positive relationship between the duration on the screen and the incidence of DES ($p = 0.654 > 0.05$ ($\alpha = 5\%$)) but a significant relationship between duration on screen with the number of symptoms experienced by students.

Keywords : Computer, covid-19, digital eye strain, digital screen, medical faculty student.

INTRODUCTION

Cell phones and gadgets are things that cannot be separated in our daily lives, especially during the COVID-19 pandemic (Alabdulkader, 2021)(Aldukhayel et al., 2022). Since the first cluster report of Covid-19 in China and continued to expand rapidly at the end of December 2019, in January 2020, the International Health Regulation Emergency Committee Meeting declared the Novel CoronaVirus (2019-nCoV) as a Global Public Health Emergency of International Concern (PHEIC) (The Lancet, 2019). In February 2020, the virus was designated by WHO as severe acute

respiratory tract coronavirus-2 (SARS-CoV-2) and the disease was called COVID-19. In March 2020, the World Health Organization (WHO) declared this event a global pandemic. This global pandemic affects the lives of many people (Mullen et al., 2020) (Irawaty et al., 2021). Maintaining social distance has become a recommended method throughout the world so that activities that were previously able to be carried out freely in public spaces are no longer possible and have turned into the concept of isolation. This has led to several regulatory changes and recommendations that eliminate mass gatherings and direct interactions such as schools, lectures, religious sites, sports arenas, stations, shopping areas, and other public areas. Studying or working from home is a mandatory choice that is made so that human life depends on technology to be able to interact with other people (The Lancet, 2019) (Ragil Anggoro et al., 2021) (Anthrayose et al., 2021).

Technology is the only tool for humans to interact, communicate, and carry out their responsibilities. Human interaction has become virtual in the form of online meetings, video and voice conferencing, recreational activities such as online games, blog writing, or social media increasing digitization in all aspects of human life (Durrheim et al., 2020) (Gaur and Sarkar, 2022). The education sector is another domain that is becoming disrupted and alternative strategies for education are needed that can be adopted during the pandemic. Educational institutions around the world are starting to use digital educational tools as diverse as Zoom, Google classroom, and Microsoft Teams. These tools also detect an increase in internet traffic. The rapidly increasing digitization during the pandemic led to an increase in the time spent in front of monitor screens including computers, laptops, smartphones, etc (Altalhi et al., 2020) (Wong et al., 2021).

The prolonged use of digital screens during the pandemic has caused our young generation to experience various health problems, not only limited to vision but also musculoskeletal problems. Digital Eye Strain (DES) is a collection of symptoms that include headaches and other symptoms such as neck and back pain due to prolonged exposure to digital screens (Babu et al., 2021). The use of computers and digital screens for more than 3 hours will put people at risk of experiencing DES. The increasing use of monitors causes various health problems that are not only limited to vision problems but also some musculoskeletal problems which are summarized in digital eye strain (DES) or computer vision syndrome (Sheppard and Wolffsohn, 2018) (Zayed et al., 2021) (Wadhwani and Upadhyay, 2021). The American Optometric Association describes DES as a complex eye and vision problem caused by excessive near vision associated with digital screen use. Symptoms related to DES are divided into: (1). Symptoms related to the surface of the eyeball such as dry eyes, watering, eye irritation, (2). Asthenopia which includes eye fatigue, eye strain, eye pain, (3). Visuals such as double vision, difficulty changing focus, blurred vision, (4). Extraocular symptoms include back, neck and headache pain. The massive increase in digitization during the pandemic puts many people around the world at increased risk of developing DES . Due to the pandemic that has spread rapidly without warning, there is little time to prepare for this change. This result causes DES to rapidly increase into a public health problem that can affect not only

health factors but also economic factors and can last a long time because it is impossible to predict when this pandemic will end (Bhattacharya et al., 2020) (Mohan et al., 2021).

The stay-at-home orders imposed around the world throughout the COVID-19 pandemic have caused most people to work from home and spend more time on screens (Coronel-Ocampos et al., 2022). This also applies to students and college students who allow excessive exposure to digital screens (Wangsan et al., 2022) (Zhao et al., 2020). The Dean of the students of the Faculty of Medicine, Muhammadiyah Malang, also urges students, both pre-clinical and clinical, to do online learning since the government of the Republic of Indonesia first announced the status of the Covid-19 pandemic. Lecture activities that are usually carried out face-to-face must be carried out through screens. This causes various kinds of complaints in students due to the use of digital screens related to vision. Research conducted by Kaya, 2019 showed that increasing daily internet use would increase asthenopia complaints, and in 2020 Kaya researched that the incidence of eye fatigue was experienced by 62% of 402 students from various faculties and majors at Pamukkale University, Turkey (Kaya, 2020).

The purpose of this study was to determine the relationship between the duration of the use of gadgets with the complaints related to DES in the students of Faculty of Medicine, University of Muhammadiyah Malang. The results obtained in this study are expected to help increase community awareness of the incidence of DES after the call to stay at home.. This research can also be used as basic data for the community health team to determine treatment strategies for this health problem.

METHODS

This research is an analytical observational study with a quantitative approach. In this study using a cross-sectional approach. The quantitative method in this study was used to determine the relationship between the long duration of use of the device and the incidence of Digital Eye Strain in students of the Faculty of Medicine, University of Muhammadiyah Malang. The study was conducted for 2 months with a simple random sampling method. The inclusion criteria of this study were students of the Faculty of Medicine, University of Muhammadiyah Malang who were carrying out online learning and were willing to fill out a questionnaire in the form of a google form.

Researchers used primary data obtained from questionnaires in the form of google forms which were distributed to students of the Faculty of Medicine, University of Muhammadiyah Malang. The symptoms of DES that were asked to students were stated in 15 complaints, namely: blurred vision, tension in the eye area, eye fatigue, red eyes, watery eyes, dry eyes, hot eyes, double vision, difficulty focusing on the screen, back neck pain, shoulder pain, and back pain. The data

obtained in this study were analyzed using the Spearman correlation test to see the relationship between the duration of device use and the incidence of Digital Eye Strain (DES).

RESULTS AND DISCUSSION

79 respondents participate in this study with the distribution of age, gender, and grade mentioned in the chart below:

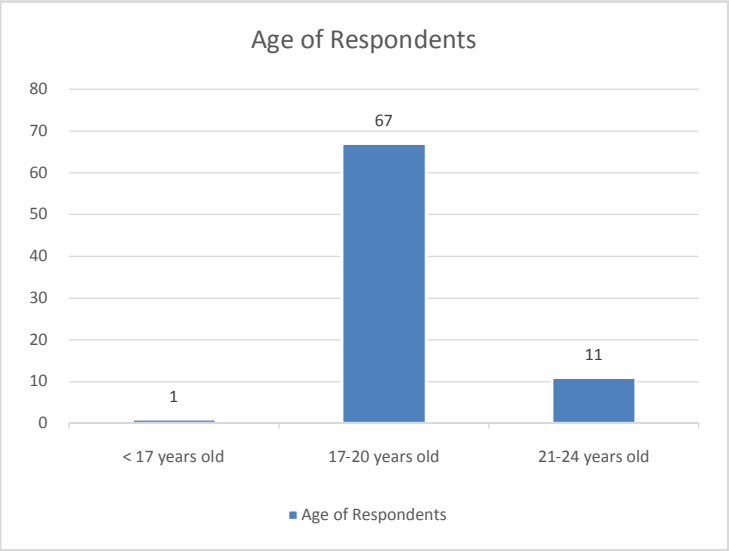

Figure 1. The age of respondents

The most age of this study were 17-20 years old 67 respondents, 21-24 years old 11 respondents, and<17 years 1 respondent.

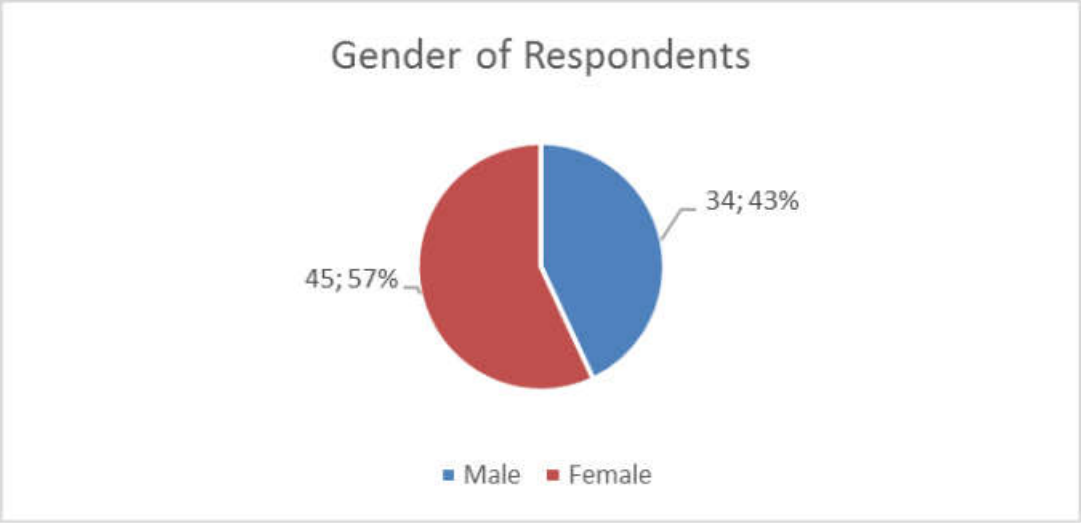

Figure 2. Gender of Respondents

The most of respondents were female, 45 respondents and 34 respondents are male.

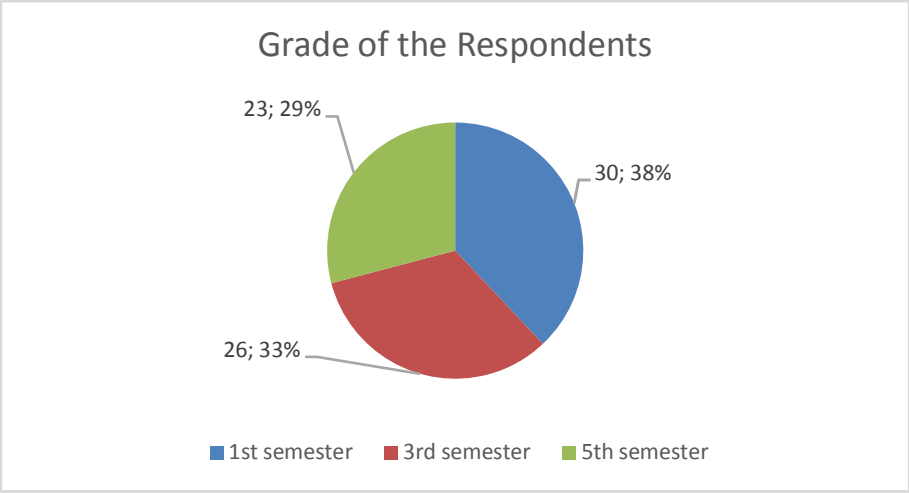

Figure 3. Grade of the Respondents

Respondents consisted of 1st semester 30 students, 3rd semester 26 students, and 5th semester 23 students.

The correlation value (r) ranges from 1 to -1, the value closer to 1 or -1 means the relationship between the two variables is getting stronger, on the other hand a value close to 0 means the relationship between the two variables is getting weaker.

Table 1. Correlation of duration on the screen and the incidence of DES

Symptoms experienced by students	Duration on the screen (hours/day)						Total
	< 3 hours	%	3 - 6 hours	%	> 6 hours	%	
Visual	1	50.00	6	18.75	10	22.22	17
Asthenopia	1	50.00	8	25.00	12	26.67	21
Ocular	0	0.00	9	28.13	7	15.56	16
Extraocular	0	0.00	9	28.13	16	35.56	25
Total	2	100.00	32	100.00	45	100.00	79
r :	0.048						
p :	0.654						

Based on the data above, it was found that the value of the relationship between duration on the screen and the incidence of DES had a correlation of 0.048 with a p-value of 0.654, this indicates that the duration on the screen with DES events has a very low relationship. The value of $p = 0.654 > 0.05$ ($\alpha = 5\%$), so it can be concluded that there is an insignificant positive relationship between the duration in front of the screen and the incidence of DES.

Table 2. Correlation between duration on the screen and the number of complaints

Number of complaints	Duration on the screen (hours/day)						Total
	< 3 hours	%	3 - 6 hours	%	> 6 hours	%	
1 complaint	2	100.00	8	25.00	7	15.56	17
2 complaints	0	0.00	10	31.25	10	22.22	20
3 atau more complaints	0	0.00	14	43.75	28	62.22	42
Total	2	100.00	32	100.00	45	100.00	79
r :	0.243						
p :	0.039						

Based on the table above, it is known that the value of the relationship between duration on the screen and DES events has a correlation value of 0.243 with a p value of 0.039, this shows that the duration in front of the screen with DES events has a low relationship. The value of $p = 0.039 < 0.05$ ($\alpha = 5\%$), so it can be concluded that there is a significant positive relationship between the duration in front of the screen and the number of DES complaints.

Online learning for reducing the impact of the spread of Covid-19 has also been implemented at the Faculty of Medicine, University of Muhammadiyah Malang since March 2020. This condition has resulted in various impacts, one of which is Digital Eye Strain (DES). Previous research conducted by Mohammed Iqbal, Ahmed El-Massry, et al. which in 2017 in Egyptian Medical Students showed that the majority of students used laptops and tablets/iPad/Notes, but this study focuses on students who mostly use laptops and smartphones. This is common because the majority of medical students use more than two devices in their daily activities.

This study shows that the duration spent in front of the screen by students is >6 hours per day, this is different from research conducted by Mohammed Iqbal, Ahmed El-Massry, et al, 2018 which showed that the majority of students spent <3 hours in front of the screen (Iqbal et al., 2018) (Bahkir and Grandee, 2020). This difference occurs because previous research was carried out before the Covid-19 pandemic, so the duration of students differing in front of the screen was mostly <3 hours per day. Another study at the beginning of the demonstration showed the same results as this study, the average respondent using gadgets was >6 hours per day. The most symptoms experienced by respondents from this study were extraocular symptoms, such as back neck pain, back pain, and shoulder pain, while previous studies showed that the most common symptoms were ocular complaints, such as blurred vision, double vision, difficulty focusing on the screen. The number of extraocular complaints is caused by a lack of ergonomics, so students should prepare an appropriate room and seat when carrying out online learning to reduce these extraocular complaints (Golebiowski et al., 2020) (Mowatt et al., 2018).

The statistical results of this study indicate that there is a relationship between the duration of use of gadgets and the incidence of DES but it is not significant, while after sorting by the number of complaints felt by the respondents, the results show significance. In line with research conducted by PratyushaGanne, et al., it showed that the higher the duration of device use, the greater the relationship with DES symptoms. The sudden and massive pandemic caused all individuals not to prepare for this well. The use of inappropriate devices will cause various kinds of complaints randomly, both ocular, asthenopia, visual, and extraocular.Similar research is still very rarely found in Indonesia, therefore it can be said that this research can be a preliminary research as the basis for further research. The limitation of this research is the subjectivity of the individual so that further research is needed with an objective examination.

CONCLUSION

During the Covid-19 pandemic, students of the Medical Faculty Muhammadiyah University of Malang, must carry out online learning activities. Increased use of monitors can cause various health problems that are not only limited to vision problems, but also some musculoskeletal problems which are summarized in Digital Eye Strain (DES) or computer vision syndrome. Symptoms associated with DES are divided into: 1) Symptoms related to the surface of the eyeball such as dry eyes, watering, eye irritation; 2) Asthenopia which includes eye fatigue, eye strain, eye pain; 3) Visuals such as double vision, difficulty changing focus, blurred vision; 4) Extraocular symptoms which include back pain, neck pain, and headache. There is a significant relationship between the duration of device use and the increasing number of DES complaints. The duration of using gadgets > 6 hours caused more complaints to the respondents. Suggestions for this research are to conduct research with objective examination methods to be able to enforce DES, analyze other factors that can affect DES in more depth, and research in other populations can also be carried out to see differences in results.

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