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Faktor Risiko Computer Vision Syndrome (CVS) *pada Mahasiswa pada Masa Pandemi Covid-19*

Risk Factors for Computer Vision Syndrome (CVS) among College Students during the Covid-19 Pandemic

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ABSTRAK

Latar Belakang: *Semakin canggihnya teknologi memberikan banyak kemudahan bagi manusia. Begitu juga dengan bidang pendidikan yang tidak dapat dipisahkan dengan teknologi, terutama pada saat pandemi ini metode pembelajaran dilakukan secara daring atau online. Hal inilah yang menyebabkan intensitas penggunaan komputer atau laptop meningkat sehingga dapat memicu terjadinya gangguan penglihatan yaitu Computer Vision Syndrome (CVS). Belum ada data pasti mengenai CVS serta penelitian CVS pada mahasiswa khususnya di Surabaya masih sangat sedikit.*
Tujuan: *Penelitian ini bertujuan untuk menganalisis faktor risiko kejadian CVS pada mahasiswa di masa pandemi COVID-19.*
Metode: *Jenis penelitian adalah observasional analitik dengan desain penelitian cross-sectional. Waktu penelitian mulai bulan Desember 2020 hingga Juni 2021. Metode pengambilan sampel dengan systematic random sampling yaitu sebanyak 249 mahasiswa yang terdiri dari semester 2, 4 dan 6 jenjang S1 Ilmu Kesehatan Masyarakat. Instrumen yang digunakan adalah CVS-Q dengan tambahan pertanyaan terkait identitas responden, riwayat kesehatan dan perilaku penggunaan komputer. Analisis data dengan menghitung Odds Ratio (OR) dengan confidence interval (CI) sebesar 95%.*
Hasil: *Jenis kelamin (OR=2,54 (1,21-5,33)) dan riwayat kelainan mata (OR=4,01 (1,97-8,16)) merupakan faktor resiko Computer Vision Syndrome (CVS) pada mahasiswa S1 Ilmu Kesehatan Masyarakat.*
Kesimpulan: *Penelitian ini menunjukkan bahwa yang merupakan faktor risiko CVS adalah jenis kelamin dan riwayat kelainan mata. Mahasiswa yang menggunakan komputer dengan intensitas tinggi sebaiknya melakukan tindakan pencegahan CVS yaitu menerapkan aturan 20-20-20, menggunakan kacamata anti radiasi, mengatur kecerahan layar komputer, memasang glare pada layar komputer, menghindari bekerja di ruangan yang gelap serta menerapkan posisi tubuh yang ergonomis saat menggunakan komputer.*

Kata kunci: *Mahasiswa, CVS, Risiko*

ABSTRACT

Background: Sophisticated technology provides many conveniences for humans, as well as education that cannot be separated from it, especially during this COVID-19 pandemic in which the learning methods are carried out online. This is what causes the intensity of using a computer or laptop to increase so that it can trigger the occurrence of visual impairment, namely Computer Vision Syndrome (CVS). There is no definite data regarding CVS and CVS research on university students, especially in Surabaya, is still very small.

Objectives: This study aims to analyze the risk factors for CVS among college students during the COVID-19 pandemic.
Methods: This research was analytic observational research with a cross-sectional research design. This research was conducted from December 2020 to June 2021. The sampling method used was a systematic random sampling addressed to 249 Public Health undergraduate students from the second, fourth, and sixth semesters. The instrument used was CVS-Q with additional questions related to respondent identity, medical history, and computer-usage behavior. Furthermore, the data were analyzed by calculating the Odds Ratio (OR) with a 95% confidence interval (CI).
Results: Gender (OR = 2.54) and a history of eye disorders (OR = 4.01) were risk factors for Computer Vision Syndrome (CVS) in S1 Public Health Science students.
Conclusions: This research shows that the risk factors for CVS are gender and a history of eye disorders. The students who use computers with high intensity should take CVS precautions, such as applying the 20-20-20 rule, using anti-radiation glasses, adjusting the brightness of the computer screen, adding an anti-glare on the computer screen, avoiding working in a dark room, and performing an ergonomic body position when using a computer.

Keywords: College student, CVS, Risk

INTRODUCTION

As time goes by, all aspects of human life have become more modern and advanced, starting from transportation, food and beverages, and technology. The existence of this increasingly sophisticated technology is defined to provide and bring more conveniences, benefits, and satisfaction for humans. This fact, therefore, makes humans significantly dependent on technology, including those who are involved in some activities in the field of education. Nowadays, especially during the COVID-19 pandemic, education cannot be separated from technology. Both teachers and students use electronic devices such as mobile phones, computers, or laptops to find information in completing assignments, increasing knowledge, and delivering material, even as a means of entertainment. Moreover, the COVID-19 pandemic also causes changes in learning methods from face-to-face to online. The latter, online learning, is done through video conferences or ZOOM meetings which involve the use of computers, laptops, or mobile phones. This is what causes the intensity of using electronic devices, especially computers or laptops, to increase, triggering a complex eye complaint called Computer Vision Syndrome (CVS) (Williams, 2021).

According to American Optometric Association (AOA), Computer Vision Syndrome (CVS) or digital eye strain is a set of problems related to eyes and eye sights or visions caused by prolonged use of computers, tablets, e-readers, and cell phones or mobile phones. Eye strain, blurred vision, dry eyes, neck and shoulder pain, and dizziness are common symptoms of CVS (American Optometric Association, 2021). According to the data from the World Health Organization (WHO), the incidence of CVS in the world in 2004 ranged from 40% to 90% which was found in workers who actively worked in front of the computer (Permana, Koesyanto and Mardiana, 2015). In Indonesia, a lot of research has been conducted to see the magnitude of the CVS problem in society, including at universities to see how big the incidence of CVS is among students.

Research conducted on students of King Saud bin Abdulaziz University, Riyadh in 2020 proved that learning methods that use electronics such as computers or laptops increase the incidence of CVS among students (Alamro et al., 2020). Moreover, research conducted at King Abdulaziz University, Saudi Arabia in 2019 showed that from 651 medical students, the prevalence of CVS was 95% (Abudawood, Ashi and Almarzouki, 2020). Another study at Superior University, Pakistan in 2016 showed that the prevalence of CVS in engineering students was 72.4%. The results of the ergonomics analysis when using computers reported that most of the students did not apply the correct ergonomic principles (Hassan, Ehsan and Arshad, 2016). Eyestrain, eyes fatigue, dry and irritated eyes, slow eye focus, and headaches are the most common symptoms of CVS (Sari and Himayani, 2018). Meanwhile in Indonesia, research at the University of Lampung in 2019 obtained that the prevalence of CVS among students was 69.60%, which was dominated by female students (Valentina et al., 2019). The results of research in 2018 on students of the Faculty of Computer Science, University of Muhammadiyah Riau, 56.6% of 83 students experienced CVS (≥ 3 complaints). 8From3 students who experienced vision complaints with symptoms of eye fatigue and strain 63.9%, dry irritated eyes 32.5%, blurred vision 43.4%, headaches 56.6%, severe eyes 50.6%, watery eyes 41.0% and difficulty focusing vision 43.45 % (Isnaniar, Norlita and Afrizen, 2021).

Some risk factors of CVS are indoor light, body distance from screen, glare from screen, sitting position and manner, and head tilt angle (Bausch & Lomb Incorporated, 2021). Similar to the research conducted by Ranasinghe et al, some risk factors of CVS include female gender, duration of computer use, current eye disease, screen not equipped with filters, use of contact lenses, and lack of knowledge about ergonomic practices (Ranasinghe et al., 2016). Computers are one of the important devices and always present in almost all institutions and organizations. Therefore, the prevalence of CVS will increase and this indirectly affects the life quality of computer users (Mani et al., 2016). CVS is a factor that affects the productivity level of computer users (O, 2019). If productivity decreases, a person's quality of life will also decrease. Until now, the supporting data regarding the prevalence of CVS and research on the incidence of CVS among university students, especially in Surabaya, is still very small. Therefore this study was conducted to analyze the risk factors for Computer Vision Syndrome (CVS) in college students during the COVID-19 pandemic. The results of this study can be used as a reference in carrying out promotive and preventive actions against CVS events.

METHOD

This research is analytic observational with a cross-sectional research design which was carried out from December 2020 to June 2021 at one of the universities in Surabaya-Indonesia. The population of this study were all active students in semester 2, semester 4, and semester 6 from the Bachelor program of Public Health Sciences. The sampling method was systematic random sampling with a total sample of 249 respondents who were calculated using the minimum sample size formula to test the hypothesis of one population (two-sided test). The research instrument is the CVS-Q which was developed by María del Mar Seguí, Julio Cabrero-García, Ana Crespo, José Verdú, Elena Ronda in 2015 by assessing 16 symptoms using a single rating scale and additional questions about respondent's identity, medical history, and computer usage behavior. The data of this study is primary data which was collected from respondents by filling out a questionnaire in the form of a google form which is distributed through social media. This research has received an ethical certificate from the ethics committee of the Faculty of Dentistry, Airlangga University with the number 146/HRECC.FODM/III/2021. The data analysis used Odds Ratio (OR) with 95% confidence interval (CI). Meanwhile, the data processing used SPSS and Epi Info 7 programs.

RESULT AND DISCUSSION

The results of data collection based on filling out questionnaires by 249 respondents are as follows:

Table 1. Prevalence of CVS in Students

CVS	n = 249	%
Yes	201	80,72
No	48	19,28

Table 2. Distribution of CVS Symptoms in Students

Symptoms of CVS	n = 249	%
Headache	200	80.32
Painful eyes	197	79.12
Itchy eyes	190	76.31
Watery eyes	176	70.68
Eyelids feel heavy	164	65.86

Based on table 1 and 2, it is known that the prevalence of CVS among students is 80.72% or as many as 201 students suffer from CVS. A person diagnosed to have CVS is when the results of the CVS-Q questionnaire score are more than equal to six points. The frequency distribution of five symptoms that are often being complained about by the respondents through the calculation of the percentage of each symptom from 249 students. From these data, it can also be perceived that the most common CVS symptom felt by students was headache with a percentage of 80.32% or as many as 200 students who experienced these symptoms. According to the results of this study, it is known that the prevalence of CVS in this study was quite high at 80.72% with the most frequent symptoms being headaches, eye pain, and burning sensation. In a study conducted by Altalhi et al., 2020 in Saudi Arabia, the most frequently reported CVS symptoms were headaches (68%) and visual disturbances (65%). Meanwhile, research conducted at the Bengaluru Technical College in 2016 found that the prevalence of CVS in engineering students was 86.67% with general symptoms of headache (83.5%), eye strain, (64.6%) and back pain (55.5%) (Ranganatha and Jailkhani, 2019). Pain that arises due to sitting too long while using a computer causes obstruction of blood flow to muscles, tendons, and ligaments resulting in decreased oxygen supply (Febrianti and Bahri, 2018).

Based on table 3, the results show that gender and eye disorders are risk factors for CVS among students. While the duration of computer use, computer screen brightness, and room lighting are not risk factors for CVS among students. The majority of respondents in this research is female in which has a greater risk of experiencing CVS complaints about 2.54 times greater than male students. This data in line with other related studies.

Table 3. Analysis Results

Variable	CVS				OR value (95%CI)
	Yes		No		
	n	%	n	%	
Gender					
Woman	173	83.60	34	16.40	2.54
Man	28	66.70	14	33.30	(1.21-5.33)
Eye Disorders					
Yes	115	90.55	12	9.45	4,01
No	86	70.49	36	29.51	(1.97-8.16)
Computer Usage Duration					
≥ 4 hours/day	155	82.90	32	17.10	1.68
< 4 hours/day	46	74.20	16	25.80	(0.85-3.34)
Computer Screen Brightness					
Bright	61	81.33	14	18.67	1.06
Dim	140	80.46	34	19.54	(0.53-2.11)
Room Lighting					
Dim or dark	27	90.00	3	10.00	2.33
Light	174	79.45	45	20.55	(0.68-8.02)

One of those is the study conducted at the Faculty of Nursing at Syiah Kuala Lumpur University in 2019 which the respondents were domintaed by female students at 91.7% (Alma and Asniar, 2019). Other research related is the reserach on students of the Faculty of General Medicine at Malahayati University in 2016, in which obtained a p-value of 0.00 for the relation between sex and CVS. It is showed that there is a significant relation between sex and the incidence of CVS in students of the Faculty of General Medicine, Malahayati University (Muchtar and Sahara, 2016). Another study on the students majoring in Information Technology at Udayana University in 2015 resulted that female students are more at risk of developing CVS than male students (Darmaliputra and Dharmadi, 2019).

Students with history of eye disorders are more in a risk of experiencing CVS which is about 4.01 times greater compared to those who do not own any eye disorders history. A research conducted at King Abdul Aziz University in 2019 has proven that there is a link between refractive errors (astigmatism, myopia and hypermetropia) with CVS in students (Abudawood, Ashi and Almarzouki, 2020). In contrast, a reserach from the Faculty of Medicine, Udayana University in 2018, showed that even the most of CVS sufferers are students which posses history of eye disorders, eye disorders are not a factor of CVS in students (Maharani, Pemayun and Handayani, 2020).

Most of the students use computer more than four hours per day, but the duration of computer use is not affecting the risk for CVS in students. It is similar to the reserach on Health Science students in Saudi Arabia in 2018, in which resulted that there is no significant relation between the duration of compuer use and the incidence of CVS (Altalhi et al., 2020). On the other hand, another research conducted in Saudi Arabia in 2020 showed that students that use computer or electronic devices more than five hours per day have 1.52 greater risk of experiencing CVS than students that use electronic devices for less than five hours (Tawil et al., 2020). Prolonged use of computer which did not intersperse with breaking time could increase the eyes accomodation which cause the tense of eyes muscles and eventually the eyes become tired (Sari and Himayani, 2018).

The results of the analysis revealed that computer brightness and room lighting are not risk factors for CVS in students. This statement is in contrast to the results of research conducted at the Faculty of Medicine and Health Sciences, Jambi University in 2020. According to the results of the analysis, students who used computers in rooms that were brighter than the brightness of the computer screens had a 2.03 times risk of experiencing CVS complaints compared to students who used computer in a room that is darker than the brightness of the computer screen (Nadia, Paramita and Rahman, 2021). Room lighting that is too bright causes the computer or laptop monitor to be unclear due to glare. However, dim light can also cause eye problems because the eyes work hard to read the monitor screen. Therefore, it is very important to adjust the lighting of the room optimally (Insani and N, 2018). Similar to room lighting, commuting light that is too bright or too dim causes the muscles and nerves of the eye to tense up so that the eyes get tired rapidly (Putri and Mulyono, 2018).

To reduce CVS symptoms due to high-intensity use of computers, several preventive measures can be taken such as adjusting lighting, installing anti-glare on computer screens, adjusting the distance between eyes and computer screens properly, and applying the 20-20-20 rule, which means that the eyes are rested every 20 minutes by averting the eyes or looking at an object 20 feet away for 20 seconds (Dotulong, Rares and Najoan, 2021). For those who have eye disorders, it is recommended

to use glasses according to the eye disorders suffered (Amalia, 2018). In addition, the use of anti-radiation glasses can avoid CVS symptoms because it reduces exposure to computer radiation to the eyes (Dabrowiecki, Villalobos and Krupinski, 2019).

CONCLUSION

It can be concluded that the symptoms that are often experienced by the majority of students experiencing CVS are headaches. The variables that became the risk factors of CVS in students are gender and eye disorders. Mean-while, the duration of computer use, computer screen brightness, and room lighting are not risk factors for CVS in students. Therefore, the university is expected to pay special attention in preventing and reducing the incidence of CVS in students. Preventive measures can be done by implementing the 20-20-20 rule: taking a 20-second break to see something else 20 feet away every 20 minutes, using anti-radiation glasses especially for students with eye disorders, adjusting computer screen brightness, installing anti-glare on the computer screen, avoiding working in a dark room and applying for an ergonomic body position when using the computer.

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