The Characteristics Of Computer Vision Syndrome Incidence In Medical Students At Baiturrahmah University Batch Of 2023

Naima Lassie[1], Rampak Mawida[2], Nurwiyeni[3], Hondrizal[4], Chandra Adilla[5], Raihana Rustam[6]

[1,2,3,4,5] Fakultas Kedokteran, Universitas Baiturrahman Padang, Indonesia
e-mail: naimalassie@fk.unbrah.ac.id

ABSTRAK

Computer Vision Syndrome (CVS) is an eye disorder caused by excessive screen time, which has become increasingly unavoidable in the digital era, particularly among medical students. This study aimed to determine the characteristics of CVS incidence among medical students of Baiturrahmah University, batch of 2023. Employing a descriptive approach, the study included 73 students selected using a purposive sampling technique, with univariate data analysis conducted through the SPSS program. The results revealed that 51 respondents (69.9%) were female, with 59 respondents (80.8%) using more than two devices daily. All respondents (100%) reported daily monitor usage exceeding four hours, categorized as unsafe screen time, and 62 respondents (84.9%) maintained an unsafe viewing distance from their monitors. Despite these findings, the majority of respondents (95.9%) did not experience CVS symptoms based on CVS-Q scores. These results suggest that while prolonged screen time and unsafe device usage are prevalent, they do not necessarily correlate with CVS incidence in this population
.

Keywords: CVS; Screen Distance; Screen Time

INTRODUCTION

The use of technology today is not limited to workers, but is also widely use in education, especially students. This technology certainly facilitates human work and makes humans more productive. It also means increasing the problem of human dependence on electronic devices with visual displays, and all of them have an important contribution in vision problems.1 American Optometric Association (AOA) defines this problem as Computer Vision Syndrome (CVS). CVS is defined as complex eye problems and visual impairments that occur as a result of activities that involve excessive screen time.2

Increased and prolonged use of digital screens can result in diseases including Occupational Health Hazard, which is commonly referred to as Computer Vision Syndrome and this syndrome is a danger.3 American Optometric Association (AOA) define Computer Vision Syndrome (CVS) as a description of a group of problems caused by computers, tablet, e-reader and continuous use of mobile phones for long periods of time which results in eye

discomfort.4 Globally, there are nearly 60 million people suffering from CVS and millions more cases are expected each year.5

The mechanism of viewing images on a computer screen is different from viewing images printed on paper because the computer screen uses a collection of small dots called pixels. Each pixel emits bright light in the center but gradually darkens at the edges. This causes the normal eye to not be able to focus on the image, but to focus on a point behind the screen called the Resting Point of Accomodation (RPA) or "dark focus". Continued eye work like this leads to the onset of CVS.6

Almost all students use computers (especially laptops and smartphones) to support their education, including medical students of Baiturrahmah University. This can be seen from the increasing amount of time students spend in front of computers in daily lectures. Research by Venkatesh et al found that almost all medical students access the internet.7 Meanwhile, Kasim's research in Makassar found that the duration of smartphone use by medical students was ≥ 8 hours per day.8

The symptoms that arise are then divided into three categories, namely ocular symptoms which include internal ocular symptomps (eye strain, pain in the eyes and around the eyes, and eye fatigue), external ocular symptomps (burning, irritation, dry eyes, and redness), visual symptoms (double vision, blurred vision at near, far and medium distances, and slow in focusing an object), and musculoskeletal symptoms (neck pain, back pain, back pain, shoulder pain, wrist pain and finger pain).3

Several studies, especially in developed countries, have shown an association between computer use and symptoms related to visual health. Based on a survey of American adults by the Vision Council in 2018, it was reported that more than 80% use digital devices for more than 2 hours/day. Recorded CVS symptoms with the use of digital devices are neck and shoulder pain (35%), headache (27.7%), eye strain (32.4%), blurred vision (27.9%) and dry eyes (27.2%).9

Research in Indonesia conducted by Anggrainy et al in 2020 on all active computer users, found that the most prevalent CVS were tired eyes (88%), neck pain (72.5%), back pain (56.5%), blurred vision (55.5%), eye strain (54%), headache (42%), eye irritation (38.5%), and dry eyes (38.5%).10

Research conducted by Alma in 2019 at Syiah Kuala University found that 74.5% of students experienced CVS.11 In addition, among the risk factors for CVS. Darmawan's research in 2021 found that the factors associated with complaints of Computer Vision Syndrome in computer employees at Diskominfo Semarang City were female (as much as 95%), length of work in front of the computer (average 4.5 hours), length of break after computer use (average 7 minutes), local lighting (average 245.9 lux), and visual distance to the computer monitor (average 48.3 cm).3

Prasetyaningsih et al research in 2022 on the characteristics and relationship of Computer Vision Syndrome (CVS) risk factors with CVS complaints in education workers, found that several risk factors associated with the use of

electronic devices such as gender, age, type of electronic device used, duration of use in a day and visual acuity with the onset of CVS complaints.11

Based on that, the continuous use of computers with a long duration will be able to cause negative effects of CVS to medical students, especially on eye health. This of course will interfere with a doctor to carry out his duties and obligations as a Medical Personnel. Based on this, the researcher is interested in conducting research on the characteristics of the incidence of CVS in medical students at Baiturrahmah University batch of 2023"..

RESEARCH METHODS

This research conducted at the Faculty of Medicine, Baiturrahmah University in February - June 2024. The type of research used is categorical descriptive study.

The population in this study were medical students of Baiuturrahmah University batch of 2023 who used computers, laptops or screen time devices with 193 people. Technical sampling method using purposive sampling with 73 respondents. The tools used in this study were questionnaires containing individual risk factors for computer vision syndrome and CVS questionnaire (CVS-Q)14. Data analysis using the SPSS statistic program, with univariate analysis.

RESULTS AND DISCUSSION

Table 1. CThe characteristics of CVS incidence in medical students of Baiturrahmah University batch of 2023 Based on the gender

Gender	*f*	%
Gender:		
Male	22	30,1
Female	51	69,9
Total	**73**	**100,0**

Based on table 1, it can be concluded that between 73 respondents, the most common gender is female, 51 respondents (69.9%).

Table 2 The CVS characteristics in medical students of Baiturrahmah University batch of 2023 based on the number of devices used daily

Number of devices used daily	*f*	%
2 Devices	59	80,8
>2 Devices	14	19,2
Total	**73**	**100,0**

Based on table 2, it can be concluded that between of 73 respondents, the most number of devices used daily is 2 devices, 59 people (80.8%).

Table 3. The characteristics of CVS incidence in medical students of Baiturrahmah University batch of 2023 based on the average duration of *screen time* in a day

Average Duration of screen time in a Day	f	%
<2 hours a day	0	0,0
2-4 hours a day	0	0,0
>4 hours a day	73	100,0
Total	**73**	**100,0**

Based on table 3, it can be concluded that all of the repondents (100%) had the average duration of screen time in a day is >4 hours per day.

Table 4. The CVS characteristics in medical students of Baiturrahmah University batch of 2023 based on the distance to monitor

Distance to monitor	f	%
Not safe	62	84,9
Safe	11	15,1
Total	**73**	**100,0**

Based on table 5, it can be concluded that out of 73 respondents, the most distance to the monitor is at unsafe distance, 62 people (84.9%).

Table 5. The incidence of CVS in medical students of Baiturrahmah University batch of 2023

CVS occurrence	f	%
CVS	3	4,1
Not CVS	70	95,9
Total	**73**	**100,0**

Based on table 5, it can be concluded that most of the respondents (95,9%), did not experience CVS. The incidence of CVS is measured by the CVS-Q *questionnaire*, declared as CVS if the score is < 6, if the score < 6 is declared as did not have CVS.

DISCUSSION

A. Gender

In this study, the gender of most respondents was female, 51 people (69.9%). The same with research conducted by Benggu *et al* (2022) about the *relationship between smartphone use during work from home* (WFH) and *Computer Vision Syndrome* (CVS), they also found that most respondent patients were female, namely as many as 82.4%.[15] Likewise, research conducted by Fadilah & Maharsi (2022) regarding the effect of using digital devices on the onset of *Computer Vision Syndrome* in medical faculty students, found that most were female (91.4%).[16]

The high incidence in women can be caused by the fact that students are dominated by female students. Research by Monaliza *et al* stated that women are more at risk of developing CVS than men.[17] The majority of female students use smartphones to access social media, take pictures, watch movies and even play online games. Because of this, women are more likely to focus their vision and continue to stare at the smartphone screen, which can cause a lack of blinking frequency and result in CVS disorders, like eye fatigue and dry (irritated) eyes.[17]

Computer Vision Syndrome CVS is also found among men. According to Septiyanti, men are at a higher risk of experiencing CVS with symptoms of redness, burning sensation, blurred vision and dry eyes. However, headaches, neck and shoulder pain are relatively more prevalent in women. Men have a higher risk of dry eye.[24]

Several studies have found that there is no relationship between gender and CVS incidence. This suggests that the risk of CVS in both sexes is the same. In this case, both men and women can experience CVS.[16]

B. Number of Devices Used Daily

The results of this study can be concluded that of the 73 respondents, the highest number of devices used daily is 2 devices, 59 people (80.8%).

The use of two devices in students is because of average students use cellphones and laptops to support college activities. In accordance with the opinion of Erlita (2022) that medical students cannot avoid *screen-time* and the use of electronic media in the learning process and seeking information, for example, medical students currently use soft copies or e-books more often than textbooks so that *screen-time* is longer.[19]

The use of gadgets, cell phones, laptops, computers, e-tablets in the world of education is used to support participants' activities in education such as carrying out examinations using laptops and computers so that they often face computer screens every day.[20]

C. Duration of using digital screen in a day

The results of this study can be concluded that 73 respondents (100.0%), they use digital screen in a day with duration more than 4 hours . Other study by Benggu *et al* (2022), they found that most of their respondents using their smartphone more than 2 hours per day (90.8%).[15] Other study by Safaryna *et al*

(2023) regarding risk factors for Computer Vision Syndrome (CVS) in college students, found that 82.9% of students use computers with a duration of > 4 hours per day.[20]

When a person use a digital screen and focuses on their eyes continuously to the screen, the muscles in the eyes will continusly contraction so the eyes will feel tired and tense. In addition, when individuals stare at a digital screen, the frequency of blinking will reduced by 6-8 times per minute, which can trigger one of the symptoms of CVS, such as dry eyes due to lack of blinking frequency.

D. Distance to monitor

In this study, the most respondents (84.9%) were at an unsafe monitor distance. Other study by Benggu *et al* in 2022 was found that 73.2% of respondents were at a distance with a monitor that was not ideal.[15] A study conducted by Ramadhan *et al* in 2022 regarding the description of individual risk factors for the incidence of computer vision syndrome in students, found that as many as 41.7% of respondents with a distance between the eyes and the center of the screen < 50 cm.[23]

Viewing distance to digital screens can increase the risk of CVS, where prolonged close viewing of screens can lead to an increase in the incidence of asthenopia, which is one of the CVS events. The *American Optometric Association* (AOA) recommends that the ideal viewing distance is ≥ 30 cm for books/HP/Laptop/ smartphone and ≥ 3 m for TV.[27]

When using a smartphone, students are more dominant to look at a closer distance when reading, watching or seeing something on the smartphone screen. This happens because the size of the smartphone screen is designed to be minimalist so that it can be easily carried around. Therefore, many students experience eye fatigue which is one of the symptoms of CVS and also some applications and features available on smartphones when run cannot be enlarged or reduced, allowing students to see from a close distance. The study by Monalisa find that people that use smartphones with a distance of less than 30 cm are significantly associated with CVS disorders.[26]

Study by Darmaliputra also reported that people who use smartphones with a viewing distance more than 30 cm can prevent the incidence of CVS. When viewing at the screen too close, the eyes will constantly focus which causes the eyes to experience fatigue and will cause visual complaints.[13]

E. Incidence of CVS

On this study, 70 people (95.9%), did not experience CVS, assessed with CVS-Q questionnare.

The results of other study by Faturahman & Purwanto (2023) also found that 65.5% of respondents did not experience CVS.[18]

But the study conducted by Benggu *et al* in 2022, they found that 87% of respondents had positive CVS symptoms.[15] Other study by Ramadhan *et al* in 2022 regarding the description of individual risk factors for the incidence of

computer vision syndrome in students, found that the most respondents (61.7%) was experiencing CVS.[22]

In this study, the most respondents did not experience CVS that assessed by CVS-Q with the score < 6.

The symptomps that may be felt by respondents who experience CVS such as eye strain or fatigue, experience dry and or irritated eyes, experience blurred vision, experience headaches. Eye strain or fatigue is a complaint that many respondents feel compared to other major complaints when working with a computer/laptop for a long time.

Darlimaputra *et al* (2019) divided the disorder of CVS into four category; visual disorders (blurred vision, double vision); extraocular disorders (neck, shoulder, back pain) asthenopia (eye fatigue, strain); and finally ocular disorders (irritation and red eyes). Some of the risk factors that trigger CVS include individual factors such as (gender, duration of working in front of a computer screen, duration of rest after using a computer, use of glasses and contact lenses, inappropriate eye-to-monitor distance, eye angle to the computer screen), and also environmental risk factors.[13]

Most respondents in this study did not experience CVS (95.9%). This could be due to the fact that the students at this study are medical students who most likely already understand about CVS and how to prevent it, such as the 20-20-20 *rule*, where every 20 minutes of viewing at a digital screen, rest your eyes for 20 seconds, by looking away from objects 20 feet or about 6 meters away.

Some other methods that can be used to prevent or reduce the symptoms of CVS include: computer screen position, the computer screen should be 15-20° below eye level measured from the center of the computer screen and a distance of 40-75 cm from the eyes to the computer screen. Lighting on the computer, preferably using a low watt lamp and the position of the computer screen to avoid glare. Anti-glare screens can be used to minimize the amount of light reflected from the screen. The sitting position on the chair should be comfortable and ergonomic. The height of the chair should match the length of the legs so that the soles of the feet can rest flat on the floor. Eyes should be rested for 15 minutes after two consecutive hours of computer use. Blink, serves to minimize the occurrence of dry eyes, because blinking can maintain *ocular surface* moisture. Regular eye examinations and good screen habits can prevent or reduce the incidence of *Computer Vision Syndrome*.[25]

.

CONCLUSION

Based on the results of this study, it can be concluded that:

Most of the respondents did not experience CVS based on the CVS-Q score, as much as 70 people (95.9%). Although all respondents used a digital screen > 4 hours per day; most (80.8%) used 2 kinds of digital screen devices and had an unsafe distance to the monitor (84.9%).

BIBLIOGRAPHY

Abbasi S, Ayoob T, Malik A. Perceptions of students regarding e-learning during covid-19 at a private medical college. Pakistan Journal of Medical Sciences 2020; 36: S57–S61.

Agustina N. Mata dan Bagian Mata. Direktorat Jenderal Pelayanan Kesehatan. 2022.

Alexandria V.The Vision Council Shines Light On Protecting Sight – And Health – In A Multi-Screen Era. 2019.

Alma S & Asniar. Faktor Risiko Computer Vision Syndrome pada Mahasiswa Fakultas Keperawatan Universitas Syiah Kuala. Jim Fkep. 2019. 4(1) ; 128–135.

American Optometric Association. Computer Vision Syndrome [Internet].AOA. 2023. https://www. aoa.org/healthy-eyes/eye-and-vision- conditions/computer-vision-syndrome?sso=y.

American Optometric Association. Computer Vision Syndrome [Internet].AOA[cited15june2021].https://www. aoa.org/healthy-eyes/eye-and-vision- conditions/computer-vision- syndrome?sso=y.2021.

Anggraeni MN, Yudiernawati A, Sutriningsih A. Hubungan Perilaku Pemakaian Laptop Dengan Kejadian Computer Vision Syndrome (CVS). Nurs News (Meriden). 2018;3(3):608–17.

Benggu A , Yendris K. Syamruth, & Grouse T.S Oematan. Relationship Between Smartphone Use During Work From Home (WFH) and Computer Vision Syndrome (CVS). (Study on 2018-2020 Students of the Faculty of Public Health, Nusa Cendana University). Timorese Journal of Public Health. 2022.4(2) ; 52-60 e-ISSN 2685-4457.

Cinthya D, Valentina D, Yusran M, et al. Faktor Risiko Sindrom Penglihatan Komputer pada Mahasiswa Jurusan Ilmu Komputer Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Lampung. Jimki 2019; 7: 29–37.

Darmaliputra K, Dharmadi M. Gambaran Faktor Risiko Individual Terhadap Kejadian Computer Vision Syndrome pada Mahasiswa Jurusan Teknologi Informasi Universitas Udayana Tahun 2015. E-Jurnal Medika 2019; 8: 95–102.

Darmawan D, Anik Setyo Wahyuningsih Keluhan Subjektif Computer Vision Syndrome Pada Pegawai Pengguna Komputer Dinas Komunikasi dan Informasi. Indonesian Journal of Public Health and Nutrition. IJPHN 1 (2) (2021) 172-183

Erlita S. Computer Vision Syndrome Pada Mahasiswa Fakultas Kedokteran Universitas Pembangunan Nasional Veteran Jakarta. Skripsi Fakultas Kedokteran. Universitas Pembangunan Nasional Veteran Jakarta. 2022

Fadilah A & Maharsi ED. Pengaruh Penggunaan Perangkat Digital Terhadap Timbulnya Computer Vision Syndrome Pada Mahasiswa Fakultas Kedokteran. Junior Medical Jurnal, 2022. 1(3).

Faturahman Y & Purwanto, 2023. Faturahman Y & Purwanto A. Deskripsi Faktor-Faktor Yang Berhubungan Dengan Keluhan Computer Vision Syndrome (CVS). (Studi pada Karyawan Universitas Siliwangi). Jurnal Kesehatan komunitas Indonesia. 2010. 19(1).

Halawa EM, Zaluchu RP & Hendra. Gambaran Gejala Computer Vision Syndrome pada Mahasiswa Fakultas Kedokteran Universitas HKBP Nommensen Medan Tahun 2019/2020. NJM. 2022. 8(1).

Kemenkes RI. Cegah mata lelah dengan metode 20:20:20. p2ptm.kemkes.go.id.

Maroof S, Mashhadi SF, Azam N, Haider K, Arshad N, Zulfiqar S, et al. Relationship of screen hours with digital eye strain: a cross sectional survey from teenagers. 2019;69(1):182-86.

Monaliza & Karim D. Faktor-Faktor Yang Berhubungan Dengan Keluhan Computer Vision Syndrome (CVS) Pada Mahasiswa Universitas Keperawatan Riau. Jom FKP. 2018;5(2).

Monaliza, 2018. Monaliza, Darwin Karim SRHD. Faktor-Faktor yang Berhubungan Dengan Keluhan Computer Vision Syndrome (CVS) Pada Mahasiswa Universitas Keperawatan Riau. JOM FKp. 2018;5(2).

Nuryasin MF. Prevalensi Computer Vision Syndrome Pada Siswa SMA Islam Al-Azhar 3 Pusat J Akarta Selama Masa Pandemi Covid-19 Dan Faktor-Faktor Penyebabnya. Skripsi Fakultas Kedokteran Universitas Islam Negeri Syarif Hidayatullah Jakarta. 2022.

Prasetyaningsih N, Hartanti MD, Adiwardhani A & Samira J. Karakteristik dan Hubungan Faktor Risiko Computer Vision Syndrome (CVS) dengan Keluhan CVS pada Pekerja Bidang Pendidikan. Jurnal Biomedika dan Kesehatan. 2022. 5(2).

Ramadhan MF, Eldrian, F. ., & Ashan, H. . (2022). Gambaran Faktor Risiko Individual terhadap Kejadian Computer Vision Syndrome pada Mahasiswa Pendidikan Dokter Angkatan 2020

Safaryna AM , Dian Prasasti Kurniawati1, Fariani Syahrul1 , Reni Prastyani2Faktor Risiko Computer Vision Syndrome (CVS) pada Mahasiswa pada Masa Pandemi Covid-19. Media Gizi Kesmas, 2023. 12(1) : 200-206.

Septiyanti RA, Fathimah A & Asnifatima A. Faktor-Faktor Yang Berhubungan Dengan Kejadian Computer Vision Syndrome Pada Pekerja Pengguna Komputer Di Universitas Ibn Khaldun Bogor Tahun 2020. Romotor Jurnal Mahasiswa Kesehatan Masyarakat. 2022. 5(1).

Sholikhah VH. Tips Cegah Cvs Akibat Terlalu Lama Menatap Layar Selama Wfh. Universitas Airlangga. 2021.

Tiomegarani AV, Wijaya H, Adinda MN, Suhada M & Anugrahsari S. Gambaran Gejala Computer Vision Syndrome Pada Mahasiswa FKIK Universitas Kristen Krida Wacana. JMJ. 2022. 10(4) ; 581-593.

Valentina D , Yusran M, Wahyudo R & Himayani R. (2020). Faktor Risiko Computer Vision Syndrome Pada Mahasiswa Jurusan Ilmu Komputer Fakultas Matematika Dan Ilmu Pengetahuan Alam Universitas Lampung. JIMKI: Jurnal Ilmiah Mahasiswa Kedokteran Indonesia. 2020. 7(2) ; 29-37. https://doi.org/10.53366/jimki.v7i2.50

Venkatesh S, Chandrasekaran V, Dhandapany G, Palanisamy S, Sadagopan S. A survey on internet usage and online learning behavior among medical undergraduates. Postgrad Med J. 2017. 93(1099):275- 279.