

## Prevalence of Computer Vision Syndrome Among Medical Students at Universitas Muslim Indonesia

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### ABSTRACT

**Introduction:** Computers are something that is needed nowadays. Computers are not only used to make work easier but also for entertainment. The use of computers in various ways will cause health problems for computer users. Computer Vision Syndrome (CVS) is a group of eye symptoms caused by prolonged use of computers or other electronic devices.

**Objective:** Determine the frequency of CVS incidents in medical faculty students at the Indonesian Muslim University in the Class of 2020.

**Method:** This study employed a descriptive design with a cross-sectional approach. Primary data were collected using the Computer Vision Syndrome Questionnaire (CVS-Q), which was distributed to medical students at Universitas Muslim Indonesia via Google Forms. The data were analyzed using Microsoft Excel and SPSS software.

**Results:** The CVS incidence rate was 116 people (50.9%). Based on gender, the largest number was women, 95 people (91.9%). Based on the use of glasses, CVS was higher among students who did not use glasses, 66 respondents (56.9%). Based on the duration of computer, the highest duration of heavy use was found by 62 people (53.4%). Based on the frequency of rest, <10 minutes more often experienced CVS, namely 89 people (76.7%). Based on viewing distance, there were more respondents with a distance of <50 cm, with 78 people (67.2%).

**Conclusion:** The most common gender who experienced CVS was female, CVS was more prevalent students who did not use glasses with a heavy duration with a rest frequency of <10 minutes and a viewing distance of <50 cm.

**Keywords:** Frequency; computer vision syndrome; student



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## Introduction

Computers are very much needed nowadays. Computers are not only used to facilitate work but also as entertainment. The use of computers in various ways will cause health problems for computer users. It is undeniable that computers can predispose to health problems<sup>1</sup>. Computer monitors not only display images and writing, but also give out radiation waves invisible to the eye, such as ultraviolet rays and X-rays, which can cause physiological distress to the eyes, head, or body. Prolonged use of a computer can cause visual impairment. Prolonged computer use can cause various conditions, including Computer Vision Syndrome (CVS)<sup>2</sup>.

Despite the widespread use of computers, there is a lack of in-depth studies specifically focused on the prevalence and risk factors of CVS among university students, particularly those studying in academic settings such as medical faculties. Existing research predominantly addresses CVS in office workers or general populations, with limited attention given to the unique conditions that students face, such as extended screen time due to online learning, academic work, and digital learning tools<sup>3</sup>. Therefore, this research seeks to bridge this gap by focusing on medical students at Universitas Muslim Indonesia, Class of 2020, to understand the prevalence and risk factors of CVS in this specific population. This gap emphasizes the urgency of conducting research in this area to inform the preventive strategies and raise awareness about CVS among students.

CVS is a set of ocular conditions caused by excessive use of computers or other electronic devices. The Occupational Safety and Health Administration (OSHA) defines CVS as a complex of eye and vision complaints experienced while using a computer<sup>4</sup>.

According to Harun et al. (2022), the increase in computer interest in Indonesia is advancing rapidly every year. According to International Data Corporation (IDC) in 2010 sales research, the number of computer enthusiasts in Indonesia was 4.27 million. The percentage of laptop enthusiasts from year to year is increasing, in 2008 46% then there was an increase in interest in 2009 to 61%, proving that there are many enthusiasts in the use of laptops. In this case, computer users from time to time have increased, according to Hosein and Shaleh 46.7% of 2,500 people in 16 Indonesian cities are computer users. According to the Central Bureau of Statistics (BPS), computer users in 2013 reached 71.19 million people. The prevalence of CVS reaches 64-90% worldwide, estimated at 60 million people and increasing annually by 1 million new cases<sup>5</sup>.

Another study by Afifah et al. (2021) states that excessive use of digital devices among students can increase the risk of developing Computer Vision Syndrome (CVS), especially among those involved in online learning activities. Despite the facts of the phenomena has become the subject of many research, those study have a limited to a general population, with focusing on the student's group, especially

medical students. This study offers new value by specifically focusing on medical students of Universitas Muslim Indonesia, Class of 2020, who exhibit more intensive digital device usage patterns within the context of online learning and other academic activities. Additionally, this study uses the updated Computer Vision Syndrome Questionnaire (CVS-Q) to more accurately measure the symptoms and risk factors of CVS<sup>3</sup>.

CVS symptoms are categorized into four major groups, namely Asthenopy (eye strain, fatigue, and pain), eyeball surface (dry, teary eyes, irritation, contact lens problems), visual (blurry vision, slow focus changes, bilateral vision, presbyopia), extraocular (neck pain, low back pain, and shoulder pain). According to Cole & Collins, these symptoms are a result of a combination of vision problems, poor work environment, and bad habits<sup>4</sup>.

Based on the explanation above, the authors are interested in knowing the frequency of CVS incidence in medical faculty students at Universitas Muslim Indonesia, especially in the class of 2020.

## Methods

This research is a descriptive study using a cross-sectional approach. The research was conducted from August to October 2023 at the Faculty of Medicine, Universitas Muslim Indonesia, Makassar.

The population in this study consisted of all students from the Faculty of Medicine, Class of 2020, totaling 256 students. The sampling technique used was total sampling, meaning the population were initially included as potential participants. After applying the inclusion and exclusion criteria, the final sample size consisted of 228 eligible respondents.

The inclusion criteria were: (1) students from the Faculty of Medicine, Class of 2020; (2) willing to participate in the study; and (3) completing the questionnaire entirely. The exclusion criteria included students who: (1) had a history of smoking; (2) were taking medications such as antidepressants, antihistamines, antibiotics, stimulants, antihypertensives, hormone therapy, or steroids for more than one month; or (3) had certain medical conditions, including diabetes mellitus, hypertension, Sjögren's syndrome, Meibomian gland dysfunction, allergic conjunctivitis, vitamin A deficiency, thyroid disorders, arthritis, or facial/trigeminal nerve injury.

Primary data were collected using the Computer Vision Syndrome Questionnaire (CVS-Q), distributed via Google Forms for efficiency and broad accessibility. This method enabled respondents to fill out the questionnaire at their convenience while reducing data entry errors. The collected data were then processed and analyzed using Microsoft Excel and SPSS software to identify the frequency and associated factors of Computer Vision Syndrome (CVS) among the study participants.

**Result**

Data collection in this study was carried out in August 2023 on pre-clinical students of the Faculty of Medicine, Muslim University of Indonesia Class of 2020. The number of respondents as a research sample was 256 people using the total sampling method, and after selecting samples using inclusion criteria and exclusion criteria, a sample of 228 people was obtained.

**Table 1. Based on CVS Occurrence**

CVS	Frequency	Percentage
CVS (+)	116	50,9%
CVS (-)	112	49,1%
<b>Total</b>	<b>228</b>	<b>100%</b>

**Source: Primary Data**

Based on Table 1, it can be seen that there were 116 people or 50.9% with CVS (+). While as many as 112 people or 49.1% with CVS incidence (-).

**Table 2. Distribution of CVS based on Gender**

Gender	Computer Vision Syndrome			
	CVS (+)		CVS (-)	
	f	%	f	%
Male	21	18,1%	29	25,9%
Female	95	81,9%	83	75,4%
<b>Total</b>	<b>116</b>	<b>100%</b>	<b>112</b>	<b>100%</b>

**Source: Primary Data**

Based on Table 2, it is known that students of the male gender who experience CVS are 21 people or 18.1% while women who experience CVS are 95 people or 81.9%.

**Table 3. Distribution of CVS based on Visibility**

Visibility	Computer Vision Syndrome			
	CVS (+)		CVS (-)	
	f	%	f	%
< 50 cm	78	67,2%	56	50,0%
> 50 cm	38	32,8%	56	50,0%
<b>Total</b>	<b>116</b>	<b>100%</b>	<b>112</b>	<b>100%</b>

**Source: Primary Data**

Based on Table 3, it is known that visibility with CVS <50 cm was 78 people or 67.2% and visibility >50 cm was 38 people or 32.8%.

**Table 4. Distribution of CVS based on Duration of Computer Use**

Duration of Computer Use	Computer Vision Syndrome			
	CVS (+)		CVS (-)	
	f	%	f	%
Light duration	5	4,3%	18	16,1%

Medium duration	49	42,2%	43	38,4%
Heavy duration	62	53,4%	51	45,5
<b>Total</b>	<b>116</b>	<b>100%</b>	<b>112</b>	<b>100%</b>

Source: Primary Data

Based on Table 4, it is known that the duration of computer use in CVS-positive students with mild duration is 5 people or 4.3%, moderate duration is 49 people or 42.2% and severe duration is 62 people or 53.4%.

## Discussion

The following discussion will discuss the results of research on the frequency of CVS incidence in 2020 Muslim Indonesian University medical faculty students.

Based on the data that has been collected and processed, it is obtained from a total of 256 respondents who were then selected according to the inclusion and exclusion criteria, 228 respondents were obtained and 116 respondents experienced CVS (+).

### Gender

The results showed that the female gender had the highest frequency ( $f = 95$ ;  $\% = 81.9$ ), while males accounted for  $f = 21$  ( $\% = 18.1$ ). This finding is consistent with the study by Qomariyah et al. (2022) with the title Factors Associated with the Incidence of Computer Vision Syndrome (CVS) in Workers at the South Tangerang City Health Office which found that the occurrence of CVS was higher in women compared to men<sup>6</sup>.

This is because physiologically, the tear film layer in women tends to thin faster with increasing age. Another cause is due to hormonal influences, the secretion of lipid components by Meibomian and Zeis glands, among others, influenced by the hormone estrogen, will suppress the secretion of these glands so that women are more susceptible to dry eye syndrome<sup>7</sup>.

However, this is not consistent with research done by (Septiyanti, et al 2020) with the title Factors Associated with the Incidence of Computer Vision Syndrome in Computer User Workers at IBN Khaldun University Bogor in 2020 which shows that there is no significant correlation between gender variables and the occurrence of CVS, where it was found that more respondents with male gender experienced CVS. The difference in research results that occurred between this study and previous studies was due to the number of respondents in the study, where there was a gender distribution that was not comparable<sup>8</sup>.

### Duration of computer use

Respondents with a heavy duration of use (>4 hours) had the highest frequency of CVS symptoms ( $f = 62$ ). This aligns with the findings of Pertiwi et al. (2022) with the title Relationship between Onset and Duration of Computer Use in Employees of Rs A.K. Gani Palembang where this study states that

more than or equal to four hours has a 6.9 times greater chance of experiencing CVS events<sup>9</sup>.

Long duration of computer use can cause CVS due to a decrease in eye accommodation ability and affect the eye, skin and musculoskeletal organs from using the computer monitor itself. This can occur because when working on a computer there is an increase in visual work involving continuous eye muscle activity such as eye motility (rapid eye movement), accommodation (continuous focus) and vergence (alignment). A series of these processes if they occur for a long duration can cause repetitive stress on the eye muscles, the eye muscles are forced to focus on one point, the frequency of blinking is reduced, the eyes are dry and sore, resulting in CVS symptoms<sup>10</sup>.

### **Frequency of rest after using the computer**

This study found that respondents who took breaks less than 10 minutes were more likely to develop CVS (f = 89). Meanwhile, this study is following the research conducted by Darmawan & Anik 2021 which states that there is a connection between the length of rest after computer use and CVS complaints<sup>11</sup>.

The frequency of breaks after using a computer has been shown to enhance comfort and relax the accommodation power of the eyes. Relaxing for 10-15 minutes after using a laptop is a protective measure against the appearance of CVS symptoms while not taking a break is a risk factor for CVS<sup>12</sup>. When resting the eyes will have sufficient time to blink, blinking is a mechanism for maintaining tear film continuity by secreting tears. The eyelids help spread the fluid across the surface and maintain moisture on the surface of the eye during blinking. Without this moisture the cornea would become dry, injured and opaque. Taking small 5-10 minutes breaks is better than long breaks every 2-3 hours of computer use. The most widely used rule now is the 20/20/20 rule, which means that after working for 20 minutes, you should take your eyes off the monitor by looking at a distant object about 20 feet (6 meters) away for 20 second<sup>2</sup>.

However, different results were obtained in research conducted by (Valentina et al 2019) with the title Research on Risk Factors for Computer Vision Syndrome in Students of the Department of Computer Science, Faculty of Mathematics and Natural Sciences, University of Lampung which showed that the frequency of rest did not have a meaningful relationship with CVS. The non-meaningful relationship between rest and the incidence of CVS may be because no direct measurement was made of the time the respondents actually spent resting, but only with a questionnaire filled out by the respondents themselves. The data obtained from this one-time measurement may not match the actual situation of the respondents when taking a break between computer use<sup>13</sup>.

### **Visibility**

The majority of respondents viewed the screen from a distance of <50 cm (f = 78; % = 67.2). Eye

visibility with a monitor that increases the risk of CVS symptoms is <50 cm. Cinthya et al. 2019 state that the recommended eye distance for viewing computer screens is 20-28 inches or the equivalent of 50-70 cm(13). The close distance when looking at the computer causes the eyes to have difficulty accommodating causing the ciliary muscles of the eye to work harder resulting in symptoms such as eye fatigue and headaches appearing<sup>14</sup>.

This is directly proportional to the results of research by (Rohmah et all 2022) with the title Relationship between View Distance and Intensity of Computer Use with the Incidence of Computer Vision Syndrome (CVS) in Final Level Nursing S1 Students at Stikes Kuningan showing that when viewing at a computer display with abnormal visibility or  $\leq 50$  cm is more susceptible to CVS<sup>15</sup>.

Different results were obtained in research conducted by (Pratiwi et all 2020) with the title Factors Associated with the Incidence of Computer Vision Syndrome (CVS) in Employees of Pt. Media Kita Sejahtera Kendari with the results that there is no relationship between visual distance and the incidence of CVS. This can occur due to various factors, such as the length of computer use. The longer a person stares at a computer screen, the longer it can cause CVS complaints to occur, whether it is for respondents who are more or less than 50 cm away from the monitor<sup>2</sup>

### **Use of Glasses**

According to the American Optometric Association (AOA), individuals who wear glasses may experience eye strain, especially if their glasses are not specifically designed for computer use. In such cases, users tend to adjust their neck position to find a more comfortable viewing angle, which can lead to neck pain due to muscle strain and frontal headaches from visual fatigue<sup>16</sup>.

This theory is supported by a study conducted by Bonita and Evi (2022), which found that individuals who wear glasses are 1.5 times more likely to develop Computer Vision Syndrome (CVS) compared to those who do not. However, the findings of the present study show a different trend. In this study, CVS was more prevalent among students who did not wear glasses (f = 66; % = 56.9%) compared to those who did wear glasses (f = 50; % = 43.1%).

This discrepancy may be attributed to the composition of the sample, where a greater number of respondents were non-glasses users. It is also possible that students who wear glasses are more aware of proper screen ergonomics, such as posture and lighting, or they may undergo regular eye checkups, which could help reduce the risk of CVS. These findings are consistent with a study by Amir (2020), which reported that CVS prevalence was higher among individuals who did not wear glasses, likely due to unfiltered exposure to digital screen radiation without visual aid protection<sup>17</sup>.

### **Limitations and Recommendations**

This study has several limitations that should be considered when interpreting the results. First, data collection was conducted using an online questionnaire (Google Form), which relies on self-reported

responses. This may introduce response bias, as participants may not always report their behaviors or symptoms accurately. Additionally, there was no clinical validation of CVS symptoms using physical or ophthalmologic examination, so the results depend solely on subjective assessments.

Second, the cross-sectional design of this study limits the ability to establish causal relationships between the risk factors and the incidence of CVS. The findings only reflect associations observed at a single point in time, not the progression or long-term effects of digital device use.

Future research should consider using a longitudinal design to examine the progression of CVS symptoms over time. Researchers are also encouraged to use mixed-method approaches, including interviews or focus groups, to gain deeper insight into students' experiences and behaviors related to screen use. Moreover, expanding the study to include multiple universities or comparing different academic disciplines may provide broader perspectives.

## **Conclusion**

This study found that Computer Vision Syndrome (CVS) is a common condition among medical students at Universitas Muslim Indonesia, Class of 2020. Several factors were associated with the occurrence of CVS, including gender, eyeglass use, duration of screen exposure, frequency of rest, and screen viewing distance. These findings indicate that prolonged and unregulated digital device use contributes significantly to the risk of developing CVS in students.

To reduce CVS risk, students are encouraged to adopt healthier screen habits, such as following the 20-20-20 rule. Future research should involve larger and more diverse samples and ideally include clinical assessments to strengthen data validity.

## **Conflicts of Interest**

There is no conflict of interest

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