

Relationship between Length and Distance of Laptop Use with Symptoms of Computer Vision Syndrome (CVS)

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ABSTRACT

The COVID-19 pandemic has changed the learning system in Indonesia a lot. Now students can learn without having to meet face-to-face and only do distance learning with laptops. The use of laptops is increasing over time and many health complaints are related to their use. This complaint is often referred to as Computer vision syndrome (CVS) with complaints that appear in the form of asthenopia symptoms (eyestrain, eye pain), external ocular symptoms (dry eyes, irritated eyes, burning eyes), visual symptoms (blurred vision, double vision, difficulty focusing vision), and extraocular symptoms (shoulder pain, neck pain, back back). CVS is influenced by several factors, such as the distance of the laptop to the eye, the duration of laptop use, the frequency of use of the laptop, the monitor, and environmental factors. This study aims to see the relationship between the duration of laptop use and distance from laptop use to eyes with CVS symptoms in Indonesian Christian University economic students class 2018. The method of this study is to apply an analytical survey design with a cross-sectional method. The data are primary data that were taken from online questionnaires and obtained by 125 respondents. The results showed that there was no significant relationship between the duration of laptop use and asthenopia symptoms, external ocular symptoms, visual symptoms, and extraocular symptoms ($p=0.862$, $p=0.984$, $p=0.902$, $p=0.539$). Meanwhile, there was a

significant relationship between the distance from laptop use to the eyes and visual symptoms in the form of blurred vision and double vision ($p=0.005$, $p=0.04$). Still, there was no significant relationship between laptop use to the eyes and symptoms of asthenopia, external ocular symptoms, and extraocular symptoms ($p=0.005$, $p=0.04$, $p=0.871$, $p=0.498$, $p=0.631$).

Keywords: Computer vision syndrome, laptop, asthenopia, external ocular, visual, extraocular

INTRODUCTION

The use of computer devices today has penetrated all levels of society, including desktop computers, laptops, smartphones, and tablets, to help and make it easier for people to complete their work. The existence of computer devices is currently very important in every home, office, and educational institution [1]. Laptops are the computer devices of choice used by people because they are more flexible and can be used anywhere. The use of laptops, especially for students, has a positive impact on the learning and teaching process. Laptops help in the lecture process both in doing assignments and for internet access and also make it easier for students to find various sources of literature and books online as learning resources [2].

During the Covid-19 pandemic in recent years, it has caused changes in the learning system in Indonesia. Learning is carried out online using various platforms that help

online learning such as Zoom, Google Classroom, and Microsoft Teams. The existence of laptops is a necessity to support the implementation of online learning activities for students during the COVID-19 pandemic [3]. The implementation of online learning has an impact on increasing students' needs and intensity in using laptops in the learning process [4]. The increasing need for using laptops not only has a positive impact but also has negative impacts. that can be caused. Online learning requires students to stare at a laptop screen for long periods every day, which poses a risk of causing health complaints related to laptop use [5].

The eye is the sense of sight whose function is to perceive the shape, size, color, and position of an object. Eye function is very important for human life, but insufficient attention to eye health has the potential to cause problems. Prolonged use of a computer can cause eye fatigue and other eye problems, especially if it is not supported by good contrast and sufficient viewing distance from the monitor. Eyes that are exposed to computer screen lighting for too long have the potential to experience computer vision syndrome (CVS) [6].

Computer vision syndrome (CVS) is a collection of eye and vision symptoms associated with activities that burden near vision and persist during or after the use of computers, tablets, e-readers, and cell phones. Symptoms in CVS are produced by interaction with a computer screen or the surrounding environment when the visual load exceeds a person's visual capabilities. The prevalence of CVS among computer users ranges from 32%-90% and is related to the number of hours spent in front of the computer [7]. Continuous computer use for three hours or more per day can cause CVS. [8]. Based on a survey from the Property & Consumer Good Industry at MarkPlus, of 124 respondents with 58.1% coming from Jabodetabek, 31.4% of people experienced an increase in the use of video calls during the pandemic. Online video conferencing rose 33.5%, just as online video or movie streaming increased from 76.6% to 85.5%.

Conditions like this can trigger eye problems which increase the risk of experiencing computer vision syndrome (CVS) [9].

Globally, there are around 60 million people who experience CVS and 1 million new cases increase every year [10]. According to the American Optometric Association (AOA), the average worker in America uses a computer both at work and at home. Of the 70 million workers, 90% of them experience CVS symptoms. In Asia, the prevalence of CVS is high. Research in Sri Lanka showed that the prevalence of CVS among computer users was 67.4%, in Hong Kong it was 67%, and in Malaysia it was 68.1%. In Indonesia, Hendra, et al's research on students at the Faculty of Public Health showed that 97% of computer user respondents experienced CVS complaints. The most complaints are felt in the neck and eyes [11].

Factors that can increase the occurrence of CVS include the duration of computer use, the distance between the eyes and the computer, whether or not there are breaks when using the computer, inappropriate lighting, and the user's visual abilities such as uncorrected refractive errors, oculomotor disorders, and tear film abnormalities [12]

Symptoms arising from CVS can be divided into four categories, namely internal ocular symptoms/asthenopia (eyes are tense and painful), external ocular symptoms (dry eyes, irritated eyes, burning eyes), visual symptoms (blurred vision, double vision, and difficulty focusing vision), and musculoskeletal symptoms (shoulder pain, neck pain, and back pain) [13]

Based on the explanation above, researchers want to know whether there is a relationship between the length and distance of using a laptop and computer vision syndrome (CVS) in students at the Faculty of Economics, Indonesian Christian University, class of 2018.

General Purpose

To determine the influence of the length and distance of laptop use on Computer Vision Syndrome (CVS) on students from the Faculty of Economics, Indonesian Christian University class of 2018.

Specific Objectives

1. Find out the number of 2018 students from the Faculty of Economics at the Christian University of Indonesia who experienced computer vision syndrome (CVS) based on the length of time they have used their laptop.
2. Find out the number of 2018 students from the Faculty of Economics at the Christian University of Indonesia who experienced computer vision syndrome (CVS) based on the distance between the laptop and the eyes.
3. Find out the relationship between prolonged use of a laptop and internal ocular symptoms/asthenopia (eye strain and eye pain).
4. Know the relationship between prolonged use of a laptop and external ocular symptoms (dry eyes, irritated eyes, and burning eyes).
5. Find out the relationship between prolonged use of a laptop and visual symptoms (blurred vision, double vision, and difficulty focusing).
6. Determine the relationship between prolonged use of a laptop and extraocular symptoms (neck pain, shoulder pain and back pain).
7. Know the relationship between distance from laptop use and internal ocular symptoms/asthenopia (eye strain and eye pain).
8. Know the relationship between distance from laptop use and external ocular symptoms (dry eyes, irritated eyes, and burning eyes).
9. Know the relationship between distance from laptop use and visual symptoms (blurred vision, double vision, and difficulty focusing).
10. Know the relationship between the distance from laptop use and extraocular symptoms (shoulder pain, neck pain and back pain).

MATERIALS & METHODS

Types of research

This research is descriptive-analytical research with a cross-sectional study design.

This research discusses the relationship between the independent variables (length of use of the laptop and distance between the eyes and the dependent variable (computer vision syndrome).

Place and Time of Research

The research was conducted at FE UKI on 15-19 July 2022.

Population and Sample

Target Population

All Indonesian Christian University students class of 2018.

Reachable Population

All students from the Faculty of Economics, Indonesian Christian University class of 2018.

Sample

All UKI Faculty of Economics students who meet the inclusion criteria.

Inclusion Criteria:

- a. UKI FE student class of 2018
- b. Be willing to fill out the informed consent and questionnaire completely
- c. Students whose activities use laptops every day

Exclusion Criteria:

- a. Did not fill out informed consent
- b. Questionnaire data is incomplete
- c. Had an eye infection when taking the sample
- d. Using glasses with poor refractive correction which is characterized by still blurred vision

Research Instrument

The instrument used in this research was a questionnaire.

Data Analysis and Processing

Data Processing

Data that has been collected using a questionnaire will be processed using SPSS version 26 software.

Data analysis

Univariate Analysis

Analysis is carried out on each variable to explain the characteristics of each variable, both independent and dependent variables.

Bivariate Analysis

Analysis was carried out on two variables using the Chi-square test to find out whether

there was a relationship between the two variables.

Research Ethics

1. An informed consent sheet is given during data collection so that respondents know the aims, objectives, and impact on themselves after filling out the questionnaire. The questionnaire is filled out at the personal will of the respondent, and if they refuse, there is no coercion from the researcher.
2. Researchers will not include the names of respondents in the research results.
3. Researchers always maintain the confidentiality of respondents' data by not including it in the research results sheet. The collected data will be processed manually by the researchers themselves so that confidentiality is guaranteed.

RESULT

1. Asthenopia Symptoms

Table 1. Frequency Distribution of Asthenopia Symptoms

Asthenopia Symptoms		
	Frequency	Percentage
No	55	44,0%
Yes	70	56,0%
Total	125	100,0%

Based on Table 1, it is known that of the 125 respondents, there were 55 respondents (44%) who experienced internal ocular symptoms and as many as 70 respondents (56%) did not experience internal ocular symptoms.

1.1. Relationship Between Eye Distance and Symptoms of Asthenopia

Table 2. The Relationship Between Laptop Use Distance and Symptoms of Asthenopia

Distance between eyes and laptop	Complaints of Asthenopia		Total	<i>p value</i>
	Yes	No		
< 50 cm	27	22	49	0,871
	40%	38.6%	39.2%	
> 50 cm	43	33	76	
	61.4%	60.0%	60,8%	
Total	70	55	125	
	100%	100%	100%	

Based on Table 2, it is known that out of 125 respondents, there were 49 respondents with an eye distance from the laptop < 50 cm. There were 27 respondents (40%) who experienced asthenopia and 22 respondents (38.6%) did not experience asthenopia. Meanwhile, there were 76 respondents whose eye distance from the laptop was \geq 50 cm. Of the 76 people, 43 respondents (61.4%) experienced asthenopia and 33

respondents (60.0%) did not experience asthenopia. The statistical test results obtained a probability value of 0.871, meaning that there was no significant relationship between the distance from laptop use and symptoms of asthenopia in UKI FE students in 2018.

1.2. Relationship Between Duration of Use and Symptoms of Asthenopia

Table 3. Relationship Between Long Use of Laptop and Symptoms of Asthenopia

Eye Distance from Laptop	Symptoms of Asthenopia		Total	<i>p-value</i>
	Yes	No		
< 50 cm	27	22	49	0,871
	40%	38.6%	39.2%	
> 50 cm	43	33	76	
	61.4%	60.0%	60,8%	
Total	70	55	125	
	100%	100%	100%	

Based on Table 3, it is known that out of 125 respondents, there were 49 respondents with an eye distance from the laptop < 50 cm. There were 27 respondents (40%) who experienced asthenopia and 22 respondents (38.6%) did not experience asthenopia. Meanwhile, there were 76 respondents whose eye distance from the laptop was ≥ 50 cm. Of the 76 people, 43 respondents (61.4%) experienced asthenopia and 33

respondents (60.0%) did not experience asthenopia. The statistical test results obtained a probability value of 0.871, meaning that there was no significant relationship between the distance from laptop use and symptoms of asthenopia in UKI FE students in 2018.

1.3. Relationship Between Duration of Use and Symptoms of Asthenopia

Table 4. Relationship Between Long Use of Laptop and Symptoms of Asthenopia

Length of Laptop Use	Tense Eyes		Total	p-value
	Yes	No		
< 4 Jam	38	29	67	0,863
	56.7%	43.3%	100,0%	
≥ 4 Jam	32	26	58	
	55.2%	48.3%	100,0%	
Total	70	55	125	

Based on Table 4, it is known that of the 125 respondents, there were 67 respondents with a laptop usage period of <4 hours. There were 38 respondents (56.7%) experiencing symptoms of asthenopia and 29 respondents (43.3%) did not experience symptoms of asthenopia. Meanwhile, 58 respondents used their laptops for ≥ 4 hours. Of the 58 people, 32 respondents (55.2%) experienced symptoms of asthenopia and 26 respondents (48.3%) did not experience symptoms of asthenopia. From the results of statistical tests, the probability value was obtained at 0.863, meaning that there was no significant relationship between the length of laptop use and symptoms of asthenopia in UKI FE students in 2018

1.4. External Ocular Symptoms

Table 5. Distribution of Respondents Based on External Ocular Symptoms

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	Frekuensi	Persentase
No	54	43,2%
Yes	71	56,8%
Total	125	100%

Based on Table 5, it is known that of the 125 respondents, there were 71 respondents (56.8%) experienced external ocular symptoms and 54 respondents (43.2%) did not experience external ocular symptoms.

1.5. Relationship Between Distance from Laptop Use and External Ocular Symptoms

Table 6. Relationship Between Distance from Laptop Use and External Ocular Symptoms

Distance between eyes and laptop	External Ocular Symptoms		Total	p value
	Yes	No		
< 50 cm	26	23	49	0.496
	36,6%	42,6%	39,2%	
> 50 cm	45	31	76	
	63,4%	57,4%	60,8%	
Total	71	54	125	
	100%	100%	100%	

It is known that from 125 respondents, it was found that when using a laptop with an eye distance of <50 cm, 8 respondents (34.8%)

experienced extraocular complaints, and 41 respondents (40.2%) did not experience extraocular complaints. Meanwhile, when

using a laptop with an eye distance of >50 cm, 15 respondents (65.2%) experienced extraocular complaints and 61 respondents (59.8%) did not experience extraocular complaints.

1.6. Relationship between Long Use of Laptop and External Ocular Symptoms

Table 7. The Relationship between Long-Time Laptop Use and External Ocular Symptoms

Length of Laptop Use	External Ocular Symptoms		Total	P value
	Yes	No		
< 4 hour	38	29	67	0,984
	53,5%	53,7%	100%	
≥ 4 hour	33	25	58	
	46,5%	46,3%	100%	
Total	71	54	125	
	56,8%	43,2%	100%	

It is known that of the 125 respondents, 67 respondents with a laptop usage period of <4 hours, of the 67 people, 38 respondents (53.5%) experienced complaints of external ocular symptoms and 29 respondents (53.7%) did not experience complaints of external ocular symptoms. Meanwhile, of the 58 respondents who used laptops for ≥ 4 hours, 33 respondents (46.5%) experienced external ocular symptoms and 25

respondents (46.3%) did not experience external ocular symptoms. From the results of statistical tests, the probability value was obtained at 0.984, meaning that there was no significant relationship between the length of laptop use and external ocular symptoms in UKI FE students in 2018.

1.7. Visual Symptoms

Table 8. Distribution of Respondents Based on Visual Symptoms

Visual Symptoms	Frequency (Yes)	Percentage (Yes)	Frequency (No)	Percentage (No)
Blurred vision	45	36.0%	80	64.0%
Double vision	18	14.4%	107	85.6%
Difficulty focusing vision	39	31.2%	86	68.8%

In the study, it was found that the visual symptoms that appeared most frequently were blurred vision in 45 people (36.0%), difficulty focusing in 39 people (31.2%), and poor vision (14.4%).

1.8. Relationship Between Laptop Use Distance and Visual Symptoms

1.8.1. Relationship Between Laptop Use Distance and Blurred Vision

Table 9. Relationship Between Laptop Use Distance and Blurred Vision

Distance between laptop use and eyes	Blurred Vision		Total	P value
	Yes	No		
< 50 cm	25	24	49	0,005
	51.0%	49.0%	100%	
≥ 50 cm	20	56	76	
	26.3%	73.7%	100%	
Total	45	80	125	

It is known that of the 125 respondents, 49 respondents with an eye distance from the laptop < 50 cm, 25 respondents (51.0%) experienced complaints of blurred vision and 24 respondents (49.0%) did not experience

complaints of blurred vision. Meanwhile, of the 76 respondents whose eye distance from the laptop was ≥ 50 cm, 20 respondents (26.3%) experienced complaints of blurred vision and 56 respondents (73.7%) did not

experience complaints of blurred vision. From the statistical test results, the probability value was obtained at 0.005, meaning that there was a significant relationship between the distance from

laptop use and complaints of blurred vision in FE UKI students in 2018.

1.8.2. Relationship Between Distance from Laptop Use and Double Vision

Table 10. Relationship Between Distance from Laptop Use and Double Vision

Distance Between Laptop Use and Eyes	Double Vision		Total	P value
	Yes	No		
< 50 cm	11	38	49	0,04
	22.4%	77.6%	100%	
≥ 50 cm	7	69	76	
	9.2%	90.8%	100%	
Total	18	107	125	

It is known that of the 125 respondents, 49 respondents with an eye distance from the laptop < 50 cm, 11 respondents (22.4%) experienced complaints of double vision and 38 respondents (77.6%) did not experience complaints of double vision. Meanwhile, of the 76 respondents whose eye distance from the laptop was ≥ 50 cm, 7 respondents (9.2%) experienced complaints of double vision and 69 respondents (90.8%) did not experience

complaints of double vision. From the results of statistical tests, the probability value is 0.04, meaning there is a significant relationship between the distance from laptop use and complaints of blurred vision in UKI FE students in 2018.

1.8.3. The Relationship between Laptop Use Distance and Difficulty Focusing Vision

Table 11. The Relationship Between Laptop Use Distance and Difficulty Focusing Vision

Distance between laptop use and eyes	Difficulty Focusing Vision		Total	P value
	Yes	No		
< 50 cm	20	29	49	0,062
	40.8%	59.2%	100%	
≥ 50 cm	19	57	76	
	25.0%	75.0%	100%	
Total	39	86	125	

It is known that of the 125 respondents, 49 respondents with an eye distance from the laptop < 50 cm, 20 respondents (40.8%) experienced complaints of difficulty focusing their vision and 29 respondents (59.2%) did not experience complaints of difficulty focusing their vision. Meanwhile, of the 76 respondents whose eye distance from the laptop was ≥ 50 cm, 19 respondents (25.0%) experienced complaints of difficulty focusing their vision and 57 respondents (75.0%) did not experience complaints of

difficulty focusing their vision. From the results of statistical tests, the probability value was obtained at 0.062, meaning that there is no significant relationship between the distance from laptop use and complaints of difficulty focusing on vision in UKI FE students in 2018.

1.9. Relationship Between Length of Laptop Use and Visual Symptoms

1.9.1. Relationship Between Long Use of Laptop and Blurred Vision

Table 12. Relationship Between Long Use of Laptop and Blurred Vision

Length of Laptop Use	Complaints of Blurred Vision		Total	P value
	Yes	No		
< 4 Jam	24	43	67	0,956

	35.8%	64.2%	100%
≥ 4 Jam	21	37	58
	36.2%	63.8%	100%
Total	45	80	125

It is known that of the 125 respondents, 67 respondents with a laptop usage period of <4 hours, 24 respondents (35.8%) experienced complaints of blurred vision and 43 respondents (64.2%) did not experience complaints of blurred vision. Meanwhile, of the 58 respondents who used laptops for ≥ 4 hours, 21 respondents (36.2%) experienced complaints of blurred vision and 37 respondents (63.8%) did not experience

complaints of blurred vision. From the results of statistical tests, the probability value was obtained at 0.965, meaning that there was no significant relationship between the length of laptop use and complaints of blurred vision in UKI FE students in 2018.

1.9.2. Long-term Relationship between Laptop Use and Double Vision

Table 13. Long-term Relationship between Laptop Use and Double Vision

Length of Laptop Use	Double Vision		Total	P value
	Yes	No		
< 4 Jam	10	57	67	0,861
	14.9%	85.1%	100%	
≥ 4 Jam	8	50	58	
	13.8%	86.2%	100%	
Total	18	107	125	

It is known that of the 125 respondents, 67 respondents with a laptop usage period of <4 hours, 10 respondents (14.9%) experienced complaints of double vision, and 57 respondents (85.1%) did not experience complaints of double vision. Meanwhile, of the 58 respondents who used laptops for ≥ 4 hours, 8 respondents (13.8%) experienced complaints of double vision, and 50 respondents (86.2%) did not experience

complaints of double vision. From the statistical test results, the probability value was obtained at 0.861, meaning that there was no significant relationship between the length of laptop use and complaints of double vision in UKI FE students in 2018.

1.9.3. The Relationship between Long-Term Laptop Use and Difficulty-Focusing Vision

Table 14. The Relationship between Long-Term Laptop Use and Difficulty-Focusing Vision

Length of Laptop Use	Difficulty Focusing Vision		Total	P value
	Yes	No		
< 4 Jam	24	43	67	0,984
	35.8%	64.2%	100%	
≥ 4 Jam	16	42	58	
	27.6%	72.4%	100%	
Total	40	85	125	

It is known that of the 125 respondents, 67 respondents with a laptop usage period of <4 hours, 24 respondents (35.8%) experienced complaints of difficulty focusing their vision, and 43 respondents (64.2%) did not experience complaints of difficulty focusing their vision. Meanwhile, of the 58 respondents who used laptops for ≥ 4 hours,

16 respondents (27.6%) experienced complaints of difficulty focusing their vision and 42 respondents (72.4%) did not experience complaints of difficulty focusing their vision. From the results of the statistical test, the probability value was obtained at 0.984, meaning that there was no significant relationship between the length of laptop use

and complaints of difficulty focusing on vision in UKI FE students in 2018.

2.0. Extraocular Symptoms

Table 15. Distribution of Respondents Based on Extraocular Symptoms

Extraocular Symptoms		
	Frequency	Percentage
No	23	18.4%
Yes	102	81.6%
Total	125	100.0%

It is known that of the 125 respondents, there were 102 students (81.6%) who experienced extraocular symptoms and 23 students (18.4%) did not experience extraocular symptoms.

2.0.1. Relationship Between Laptop Use Distance and Extraocular Symptoms

Table 16. Relationship Between Laptop Use Distance and Extraocular Symptoms

Laptop Usage Distance	Extraocular complaints		Total	P value
	Yes	No		
< 50 cm	8	41	49	0,631
	16.3%	83.7%	100%	
≥ 50 cm	15	61	76	
	19.7%	80.3%	100%	
Total	23	102	125	

It is known that from 125 respondents, it was found that when using a laptop with an eye distance of <50 cm, 8 respondents (34.8%) experienced extraocular complaints, and 41 respondents (40.2%) did not experience extraocular complaints. Meanwhile, when using a laptop with an eye distance of >50 cm, 15 respondents (65.2%) experienced extraocular complaints and 61 respondents (59.8%) did not experience extraocular complaints.

DISCUSSION

Asthenopia Symptoms

It is known that of the 125 respondents, 55 respondents (44%) experienced external ocular symptoms and 70 respondents (56%) did not experience asthenopia symptoms.

It is known that of the 125 respondents, 49 respondents with a laptop usage distance of <50 cm, 27 respondents (40%) experienced complaints of asthenopia and 22 respondents (38.6%) did not experience complaints of asthenopia. Meanwhile, of the 76 respondents whose laptop usage distance was ≥ 50 cm, 43 respondents (61.4%) experienced complaints of asthenopia and 33 respondents (60.0%) did not experience complaints of asthenopia. From the statistical test results, the probability value was obtained at 0.871, meaning that there was no

significant relationship between the distance from laptop use and symptoms of asthenopia in UKI FE students in 2018.

The results of this study are not in line with research conducted by Mulyono et al. 2020, the research sample, namely design workers at PT PAL Surabaya, was 42 respondents who stated that the eye distance to the computer was divided into optimal and not optimal. The optimal distance is 50-60 cm, while the non-optimal distance is <50 and >60 cm. Based on research from a total of 42 respondents, there were 16 respondents (38.1%) who had a distance of 50-60 cm. Meanwhile, in the <50 and > 60 cm categories, there were 26 respondents (61.9%). The chi-square statistical results obtained from the test found that there was a significant relationship between the distance of the eye to the VDT and the symptoms of asthenopia. This is following the main reason asthenopia symptoms occur, namely the distance is too close between the eyes and the monitor so tension occurs due to being forced to work at close range and for a long time. The statistical test results for eye distance to the computer obtained a value of $p=0.007$, so it has a relationship with CVS symptoms at PT PAL Surabaya [32].

It is known that of the 125 respondents, 67 respondents with a laptop usage period of <4

hours, 38 respondents (56.7%) experienced complaints of asthenopia symptoms, and 29 respondents (43.3%) did not experience complaints of asthenopia symptoms. Meanwhile, of the 58 respondents who used laptops for ≥ 4 hours, 32 respondents (55.2%) experienced complaints of eye strain, and 26 respondents (48.3%) did not experience symptoms of asthenopia. From the statistical test results, the probability value was obtained at 0.863, meaning that there was no significant relationship between the length of laptop use and symptoms of asthenopia in UKI FE students in 2018.

The results of this study are not in line with research conducted by Sawaya et al. 2020 which examined a research sample of 453 people. The results of this study showed that 85.3% of respondents who used laptops for > 4 hours experienced symptoms of asthenopia. There is a significant difference in length of use and symptoms of asthenopia (95% CI: $p= 0.000$). Differences in the results of this study may occur because there are differences in the number of samples and characteristics of the samples taken [31].

External Ocular Symptoms

It is known that of the 125 respondents, there were 71 respondents (56.8%) experienced external ocular symptoms and 54 respondents (43.2%) did not experience external ocular symptoms.

It is known that of the 125 respondents, 49 respondents with an eye distance from the laptop < 50 cm, 26 respondents (36.6%) experienced external ocular symptoms, and 23 respondents (42.6%) did not experience external ocular symptoms. Meanwhile, of the 76 respondents whose eye distance from the laptop was ≥ 50 cm, 45 respondents (63.4%) experienced external ocular symptoms and 31 respondents (57.4%) did not experience external ocular symptoms. From the statistical test results, the probability value was obtained at 0.498, meaning that there was no significant relationship between the distance from laptop use and external ocular symptoms in UKI FE students in 2018.

In research conducted on students at Ajman University, United Arab Emirates regarding computer vision syndrome, it was found that the most common problems were burning eyes, headaches and dry eyes with percentages of 54.8%, and 53.3% respectively. , and 48%. In this study, there was no relationship found between the incidence of dry eyes, which is one of the external ocular symptoms, with the distance between the eyes and the computer screen, as well as the duration of computer use, with p values of 0.76 and 0.08 respectively. This research is in line with our research, where the p-values between the incidence of dry eyes the distance between the eyes and the laptop screen, and the duration of laptop use are 0.49 and 0.98 respectively. The research mentioned above found that the factors that play a significant role in causing dry eyes are the frequency of rest and the use of screen filters, with p-values of 0.01 and 0.02 respectively.

Visual Symptoms

Based on research conducted, the most frequently occurring symptom representing visual symptoms is complaints of blurred vision. This is in line with Juniawan's research in 2017 which found that the incidence of blurred vision was 18 out of 57 (31.6%). There was also an opinion from Rosenfield in 2011 which stated that between 64% -90% of computer users experienced visual disorders such as diplopia and blurred vision. .23

The results of the research regarding the relationship between distance from laptop use and complaints of visual symptoms found a significant relationship between distance from laptop use and complaints of visual symptoms in the form of blurred vision (p value=0.005), double vision (p value=0.04), and there was no significant relationship with difficulty focusing. vision (p value=0.062). Abudawood et al 2020 stated that the relationship between the presence of CVS, especially blurred vision and double vision, and distance from laptop use is a statistically significant risk factor

($p=0.02$). This is in line with research by Logaraj et al which states that students who view computers at a distance of fewer than 20 inches (50 cm) are at higher risk of developing CVS. Agarwal et al also suggested that computer viewing distance is an important risk factor for eye complaints. The closer the VDT is to the eye, the harder the eye has to work to accommodate it. These problems can be explained because close distances cause excessive accommodation, resulting in blurred vision, double vision, and difficulty focusing.³⁰

Furthermore, in the research, no significant relationship was found between the duration of laptop use and complaints of visual symptoms in the form of blurred vision (p value= 0.956), double vision (p value= 0.861), and there was no significant relationship with difficulty focusing vision (p value= 0.420). This is in line with research conducted by Kumasela et al which obtained p results for the relationship between blurry eyes and length of laptop use of $p = 0.664$. This is contrary to the opinion of Rossignol et al who reported that the prevalence of visual symptoms increased significantly in individuals who spent more than 4 hours every day working on video display terminals (VDT).²⁰ Another opinion that was not in line with the research was also expressed by Bogdanici et al. Al said that headaches, blurred vision, and ocular congestion are the manifestations that are most often determined by the length of gadget use.

Extraocular Symptoms

It is known that of the 125 respondents, there were 102 students (81.6%) who experienced extraocular symptoms and 23 students (18.4%) did not experience extraocular symptoms.

It is known that from 125 respondents, it was found that when using a laptop with an eye distance of <50 cm, 8 respondents (34.8%) experienced extraocular complaints and 41 respondents (40.2%) did not experience extraocular complaints. Meanwhile, when using a laptop with an eye distance of >50

cm, 15 respondents (65.2%) experienced extraocular complaints and 61 respondents (59.8%) did not experience extraocular complaints. From the statistical test results, the probability value was obtained at 0.631, meaning that there was no significant relationship between the length of laptop use and extraocular symptoms in UKI FE students in 2018.

In a study by Khola Noreen, Zunaira Batool et al of 245 undergraduate medical students at the Faculty of Medicine, Bahria University and Dentistry, Karachi, there was no significant relationship between the distance from laptop use and extra external symptoms with a p -value of 0.255 [29]

It is known that from 125 respondents, it was found that when using a laptop with an eye distance of <4 hours, 11 respondents (47.8%) experienced extraocular complaints and 56 respondents (54.9%) did not experience extraocular complaints. Meanwhile, when using a laptop with an eye distance of > 4 hours, 12 respondents (52.2%) experienced extraocular complaints and 46 respondents (45.1%) did not experience extraocular complaints. From the statistical test results, the probability value was obtained at 0.593, meaning that there was no significant relationship between the length of laptop use and extraocular symptoms in UKI FE students in 2018.

In research by Logaraj M, Madhupriya V et al, regarding computer vision syndrome in medical and engineering students, it was found that 60.7% of medical students experienced extraocular symptoms. In this study, there was no significant relationship between the length of laptop use and extraocular symptoms with a p -value of 0.0830.

Laptop users are more likely to experience musculoskeletal symptoms. Such as neck pain and back pain are the most common complaints. Unlike computers, laptops are more portable, lighter, and easier to move, so laptop users pay less attention to their posture while working. The very low position of the monitor and the horizontal eye view cause workers to bend over more often when

working. Positions that are not ergonomic at work are one of the factors causing complaints of neck and back pain.[29,30].

CONCLUSION

Based on the results of research conducted on UKI Faculty of Economics students class of 2018, it can be concluded as follows:

1. Research conducted on 125 UKI Faculty of Economics students class of 2018, found:
 - ✓ Many students suffered from CVS when using laptops < 4 hours with asthenopia symptoms of 38 students (54.3%), external ocular symptoms of 38 students (54.3%), visual symptoms of 27 students (52.9%), and extraocular symptoms of 56 students (54.9%).
 - ✓ Many students suffered from CVS when using laptops > 4 hours with asthenopia symptoms of 32 students (45.7%), external ocular symptoms of 33 students (46.5%), visual symptoms of 24 students (47.1%), and extraocular symptoms of 46 students (45.1%).
2. Research conducted on 125 UKI Faculty of Economics students class of 2018, found:
 - ✓ Many students suffered from CVS at a laptop usage distance of <50 cm with asthenopia symptoms of 27 students (38.6%), external ocular symptoms of 26 students (36.6%), visual symptoms of 27 students (52.9%), and extraocular symptoms of 41 students (40.2%)
 - ✓ Many students suffered from CVS when using laptops > 50 cm with asthenopia symptoms of 43 students (61.4%), external ocular symptoms of 45 students (63.4%), visual symptoms of 24 students (47.1%), and extraocular symptoms of 61 students (59.8%).
3. There is no relationship between the duration of laptop use and symptoms of asthenopia

4. There is no relationship between the duration of laptop use and external ocular symptoms
5. There is no relationship between the duration of laptop use and visual symptoms
6. There is no relationship between the duration of laptop use and extraocular symptoms
7. There is no relationship between the distance from laptop use and the symptoms of asthenopia
8. There is no relationship between the distance from laptop use and external ocular symptoms
9. There is a significant relationship between the distance from laptop use and visual symptoms (blurred vision and double vision)
10. There is no relationship between the distance from laptop use and extraocular symptoms

Declaration by Authors

Ethical Approval: Approved

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