

Original Research

Computer Vision Syndrome (CVS) in Medical Students Reduced by Eye Exercise and Acupressure



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Article Info	Abstract
Article history: Received: 11 March 2023 Accepted: 29 April 2023	<p><i>Introduction:</i> Using a computer continuously for 4 hours or more can cause Computer Vision Syndrome (CVS). Since the implementation of distance learning, computers operation and users have increased, especially among students because learning can take place from morning to evening. So, it can have a bad impact on health. Especially eye, such as the occurrence of Computer Vision Syndrome. The study aims to identify the effectiveness of alternative therapies of eye exercise and acupressure against symptoms of Computer Vision Syndrome (CVS) in medical students at the University of Papua.</p> <p><i>Methods:</i> This study uses a non-equivalent control group design and then groups into control and experimental group. Sampling using a non-probability sampling technique with purposive sampling approach with a total sample of 38 people. Data collection was conducted using questionnaires and data were analysed using the Wilcoxon statistical test to compare between pre-test and post-test and the Mann-Whitney test to compare between treatment and control groups.</p> <p><i>Results:</i> The results of statistical analysis using the Wilcoxon test showed that the CVS scores in the experimental group after the treatment of eye exercises and eye acupressure were $P < 0.05$, while in the control group which was not treated with $P > 0.05$. Mann-Whitney test experimental and control groups $P < 0.05$.</p> <p><i>Conclusion:</i> Eye exercises and acupressure have an effect on the reduction of CVS symptoms. There are effects of Eye exercises and acupressure that can reduce CVS symptoms.</p>
Keywords: computer vision syndrome, eye gymnastics, eye acupressure	

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INTRODUCTION

Computers at this time are very widespread, almost all human activities are supported by computers. Various daily activities such as work, and learning are inseparable from the important role of computers. The many benefits of computers result in the number of computer users increasing every year [1]. Computers used in the workplace are increasing along because it gives the efficiency of energy and time. The advantage that we can get in the use of computers is that the work will be quickly resolved, and the results will be maximized because the computer has a high speed and accuracy in working on its function [2].

Currently, computers greatly facilitate human activities, but many studies showed that computers with long duration cause problems related to discomfort in the eyes and can cause various complaints in the eye [3]. The American Academy of Ophthalmology (AOA) states that prolonged computer use results in eye fatigue, redness, blurred vision, myopia, and other eye symptoms [4].

Visual Display Terminal (VDT) or this type of computer screen is what gives a bad impact on the eyes. Computer monitors emit radiation and waves such as ultraviolet rays and X-rays which, when exposed for a long time, will cause physiological disorders in the eyes [5].

Prolonged use of electronic media, computers, and other digital tools can have a significant impact on vision health problems [6]. Excessive computer use can lead not only to diseases of the eyes, but also of the head, or limbs [5]. Increased computer use among

college students for a long time is at risk of causing health complaints [7]. A collection of symptoms that are often complained by computer users and other digital devices that cause eye disorders due to focusing vision for a long time in front of a computer is known as Computer Vision Syndrome (CVS) [8].

Computer Vision Syndrome cause various effects that greatly impair productivity, fitness and quality of daily life. It does not only occur due to computers but also tabs, mobile phones, and other electronic media related to monitor screen radiation [8]. Globally, the number of Computer Vision Syndrome sufferers worldwide is estimated at 60 million people and increases by one million new cases each year. The prevalence of CVS reaches 64-90% in Visual Display Terminal (VDT) users. Cases of Computer Vision Syndrome are 90% more at risk in people who work or spend 3 hours or more in front of a computer [9]. In India, 78.6% of medical students experience CVS while using a computer. the prevalence of CVS in Nepali medical students is about 71.6%, in Pakistani medical students as high as 94.8%, and 89.9% of Malaysian students. A survey of ophthalmologists showed that almost 14.5% of patients schedule an examination mainly because of problems related to working with a computer [10].

Indonesia has shown 92.9% of computer users have complained of any symptoms in the eye [11]. Research on college students also showed that the highest prevalence of CVS was among engineering students (81.9%) and followed by (78.6%) among medical students [7]. Computer vision syndrome (CVS), typically with blurred vision, tired eyes, dry,

burning sensation, reddish, and often accompanied by headaches. Therefore, the cause of various effects which are highly disruptive and reduces productivity by 40% and daily physical condition. So, the right path is necessary for overcoming computer vision syndrome [12]. There are various alternative techniques that are done to deal with the symptoms of Computer Vision Syndrome, including resting eyes after 20 minutes of using a computer, looking away at other objects as far as 6 meters for 20 seconds, installing a computer light filter so the eyes are not exposed to glare of the monitor screen radiation, and it is recommended [13].

One eye therapy that can be done to reduce the symptoms of fatigue in the eyes is to do eye exercises. Eye Gymnastics is a technique used so that the eyeball is accustomed to bending and moving according to the reach of the eye because the wider the reach of the eye, the more effective it is in reading [14]. One of the traditional alternative techniques in the form of acupressure is a safe and practical treatment technique to do. The Ministry of Health of the Republic of Indonesia developed acupressure as part of a type of alternative traditional health service skills [15].

Based on the description above, the researchers concluded that it takes a useful alternative therapy to strengthen the auxiliary muscles of vision so the eyes will not get tired easily, improve blood circulation in the eyes and provide comfortable accommodation. All that can be obtained from eye exercises and acupressure. The result of this study is to identify the effect of eye exercises and acupressure.

METHODS

This study is a type of quantitative research with a quasi-experimental design through pre-test and post-test design. This design involves two groups, experimental group and control group. The sampling technique used is non-probability with a purposive sampling approach with a sample of 38 people in 2018, 2019, 2020, and 2021 students of the Faculty of Medicine, University of Papua, who meet the inclusion criteria. On the calculation of the sample number of 38 people. The number of samples was divided into 2 groups, namely the control and treatment groups. The treatment group was given treatment in the form of eye exercises and acupressure, while the control group was not given treatment.

Examination of CVS symptoms was carried out before doing eye exercises, three days before doing eye exercises and one day after the last day of doing eye exercises. The treatment group is given eye exercises and acupressure within a week and carried out five examinations, with a treatment duration of approximately 10-15 minutes.

Data analysis is divided into univariate analysis and bivariate analysis. Univariate analysis was conducted to determine the characteristics of the research sample. Bivariate analysis aims to explain the presence or absence of the effect of eye exercises and acupressure on the reduction of CVS symptoms. In this study to test the hypothesis used two tests, namely: Wilcoxon test to compare CVS symptoms before and after eye exercises in each group and Mann-Whitney test to test the difference in the effect that occurs in both groups. The value of the

statistical test will be meaningful if the value of significance $p < 0.05$.

RESULTS

General Research Description

The research on eye exercises and eye acupressure on Computer Vision Syndrome symptoms in students of the Faculty of Medicine, University of Papua was conducted from May to July 2022. Based on the data taken by the researchers, the number of students of the Faculty of Medicine, University of Papua until the even semester of the 2022/2023 academic year amounted to 146 people. In this study, researchers used students who are active in the academic stage as respondents in the study. Data collection on medical students was done through Zoom meetings by filling in through a Google form and face-to-face directly conducted on campus, one week before the provision of gymnastics and acupressure. The questionnaire was completed by 107 students from the 2018 to 2021 batch.

Subject Characteristics

The number of students of the Faculty of Medicine, University of Papua, who responded was 107 students from the 2018 to 2021 batch. From 107 students, only 100 people used computers and 7 used mobile phones. So, only 100 students were chosen, and 7 respondents were excluded.

Characteristics of respondents also were reviewed by gender, age, and batch. The majority of the respondents were women 70 (70.0%) and 30 (30.0%) men. Based on age,

most of the respondents who participated were 20 (28.0%) years old, while the fewest age is 17 years old as much as 1 (1.0%) respondent. Also, the batch that participated the most was 2019 (31.0%) and the fewest was 2018 with 20 (20.0%) people. Results examination is shown on the next page.

Symptoms of Computer Vision Syndrome

Table 1. shows that from 100 people who used computers, there are 76 respondents experienced CVS and 24 respondents did not experience CVS symptoms. The characteristics of respondents who experienced symptoms of CVS (Computer Vision Syndrome) reviewed are gender, age, and generation of respondents. 100 respondents experienced CVS. The most respondents who experience CVS were women. There are 60 (78.9%) respondents with CVS experiences and 9 (9.0%) without CVS experiences. CVS symptoms were found to be less in men. There are 16 (21.1%) respondents. There are 15 people (15%) did not experience CVS. The most age with CVS experiences was 20 years old namely 22 (22.0%) respondents. The least number was 17 and 23 years is 1 person (1.0%) people.

The next characteristics were viewed by batch (class of the year). The highest number of CVS experienced was 2019. There are 23 (23.0%) respondents and those who did not experience CVS were 8 (8.0%) respondents. Then, batch of 2018 with less CVS experience as much as 14 (14.0%) respondents and those who never experience CVS were 6 (6.0%) respondents. Of the 76 students who

experienced CVS, the most common symptoms experienced were watery eyes as many as 71 people (93.4%), followed by second-order headaches by 69 people (90.8%), and 63 people (82.9%) complaints of pain and complaints of increased sensitivity to light. The least CVS complaints experienced by respondents were complaints of difficulty focusing on seeing close as much as possible and complaints of holes coloured 28 (36.8%) respondents.

Characteristics of Control & Treatment Groups

Out of the 100 selected respondents, only 38 people were detected by CVS. From 38 respondents, the most complaints were watery eyes by 37 (9.3%) respondents, itchy eyes by 35(9.4%) respondents and headaches by 31(8.3%) respondents and the least complaints worsening vision by 10(2.7%) respondents and difficulty focusing on seeing near 11 (2.9%) respondents. Post-test results from 38 respondents experienced the most complaints of watery eyes as many as 30 (10.7%) respondents. Furthermore, itchy eyes by 29 (10.4%) respondents and increased sensitivity to light by 25(8.9%) respondents. The least complaints experienced in the post-test results were light holes and worsening vision 9 (3.2%) respondents.

Mean Scores of Computer Vision Syndrome

CVS symptom scores for both treatment and control groups are contrasted. The average CVS score in the control group was 14.00

before the examination. However, the actual CVS score was 12.58. The control group had an average symptom score of 1.42. The CVS symptom level on the pre-test was 16.32 and lowered to 7.05 on post-test for the treatment groups. It can be seen below (Table 2).

The treatment group's mean CVS symptom score reduced by 9.27 points on average. When the difference test was carried out for the pre-test data, the p -value was 0.107 or more than p values 0.05 ($p > 0.05$) which means that there was no significant difference between the treatment group and the control group at the time of initial data collection or pre-test. The Effect of Eye Gymnastics and Eye Acupressure on CVS Symptoms Bivariate analysis was performed to determine the effect of independent variables (eye gymnastics and eye acupressure) with dependent variables (CVS symptoms) indicated by p values < 0.05 . So, the CVS scores difference between pre-test and post-test used is an alternative test (Wilcoxon test).

The difference in mean CVS scores after eye exercises were performed in the control group and treatment group, first ensure the data was normally distributed using the Shapiro-Wilk test. After the normality test, the data was not normally distributed. So, the post-test CVS score difference test uses an alternative test (Mann-Whitney test).

Statistical tests with Wilcoxon T-Test on pre-test and post-test respondents obtained $p=0.216$ or $p > 0.05$. This means that there is no significant difference in CVS symptom scores before and after treatment.

Table 3. shows the CVS score differences between *pre-test* and *post-test* in control group. Statistical tests with Wilcoxon T-test

used for *pre-test* and *post-test*. In treatment group obtained $p = 0.000$ or $p < 0.05$ means there is a significant difference in CVS symptom scores felt by respondents before and after eye gymnastics and acupressure treatment. Moreover, the difference in mean scores especially for post-test in treatment and control groups is clearer. Shapiro-Wilk normality test showed the post-test value of the treatment group with $p\text{-value} = 0.000$ and control group with $p\text{-value} 0.023$ ($p > 0.05$). This suggests that data from this population

are not normally distributed. So, it was continued with an alternative test, Mann-Whitney test.

Table 4. shows the difference in means scores on post-test CVS for treatment and control groups. Mann-Whitney test showed $p\text{-value}$ for post-test treatment and control group was 0.006. This result was below $\alpha\text{-value}$ (0.05) which means H_0 was rejected. Therefore, there was a significant decrease in mean CVS score after gymnastics and eye acupressure for both groups.

Table 1

Symptoms of Respondents

Symptoms	Frequency	Presentation %
CVS	76	76,0
No CVS	24	24,0
Total	100	100,0

Table 2

Mean scores of CVS

Test	N	Treatment Groups	Control Groups
Pre-test	38	16,32	14,00
Post-test	38	7,05	12,58
Difference		9,27	1,42

Table 3

Score differences of CVS pre-test and post-test in control group

Groups	N	Mean	p-value
Pre-test	19	16,32	0,000
Post-test	19	7,05	

Table 4

Difference of means scores on post-test CVS for treatment and control groups

Groups	N	Mean	p value
Post-test (control)	19	12,58	0,006
Post-test (treatment)	19	7,05	

DISCUSSION

Based on the results of this study, the number of respondents involved in this study amounted to 100 students. The most respondents were women (79 students) (79.0%) and men 21 (21.0%). From 100 respondents who used computers, 76 students experienced symptoms of Computer Vision Syndrome. The respondents with the most Computer Vision Syndrome experience were women (78.9%) of respondents and men 16 respondents (21.1%). It is because respondents were women and men. This means that if the respondent uses the computer for more than 4 hours, it can cause eye strain and soreness and fatigue. This leads to increase CVS symptoms.

By habits, women are more details and diligent when doing many things than men. Women will always focus on what they are doing, including operating the computer. So, they will be easier to experience symptoms of Computer Vision Syndrome [16]. Physiologically, tear layers in women's eyes thins more quickly with age due to degenerative processes. Furthermore, it will affect tear secretion that are less in women than men. As a result, dryness, and fatigue of the eyes. The tear layers would help keep the

eyes positioned. The tear layer consists of a watery layer, an oily layer, and a sticky mucus layer. These three layers act as moisturizers, retain tears, slow evaporation and protectors [6]. Women's natural feelings are more sensitive and they cry more easily than men. Indirectly, it will restore liquid and removes the toxins from itself.¹⁴ This study supported by Intan Putri Arisandi and Shanta Kumari (2014) research which states that the female sex has a higher risk of experiencing CVS symptoms [14].

By age study viewed, the age that contributes the most is 17 to 24 years old who experienced CVS. The most participating age was 20 years old 22 (28.9%) respondents. Students of this age are more active in learning and improving the knowledge by using computers as a tool to get more information from internet, including listening to music, watching, and playing games. The number of activities will be able to cause various CVS complaints. So, the age context is associated with demands or needs of students for computers, one of the negative impacts can be CVS complaints.

Age is one of the risk factors for CVS symptoms. Increasing age results in decreased eye accommodation or the ability to focus on an object. Decreased eye

accommodation will have an impact on the eye strain muscles. Thus, the eyes get tired more quickly. This result is supported by Rima Maulida (2017) which was conducted on 83 respondents and showed that most respondents were at the age of 20 years, more exactly 27 (32.5%) respondents [17].

The least age was 17 years old, 1 (1.3%) respondent. It happened because the distribution of respondents who experience CVS at that age is the least, and the duration of computer screen exposure was lower because the demands of online learning in early semester students are still lower than other batches. The higher his age and education level, the greater his need for computer usage.

By the contribution of each batch that has the most certainty from 2019 class of 31(31.0%) respondents and the least from 2018 class (20.0%) respondents. The class of 2019 who participated the most, namely 23(30.3%) respondents. The high number of CVS complaints in this batch was caused by computers operating more frequently or more than 4 hours. The most activities were used for online studying. The class with the least CVS levels is the class of 2018, which is 14 people (18.4%).

This happens because the respondents of the class of 2018 have a small number and almost all learning in the current semester takes place offline and the level of stress due to the learning module load is reduced because they are at the end of the semester. So, the CVS complaints obtained are lower than other forces. Similar to Apriyanti's previous research in 2021 Characteristics reviewed by batch, it can be seen that most

respondents came from the class of 2019, which was 64 (36.2%) respondents [18].

Computer Vision Syndrome (CVS) is a set of eye and vision-related symptoms caused by prolonged exposure to electronic tools such as computers [19]. CVS is characterized by visual symptoms resulting from interaction with a computer screen or its environment. In this study, there are 76 students who experienced CVS, the most common complaints were watery eyes 9.0%, and second, itchy eye symptoms 8.6% of respondents. Symptoms of watery eyes and itchy eyes are one of the symptoms that arise due to dry eyes due to staring at a computer screen for too long. Watery eyes during computer operations can be associated with dry eyes which easier to accumulate dust and fine dirt on the eye surface. Moreover, then it will be irritated and reddish. Next, it will make vision blurred and itchy eyes. When the eyes become dry, tears will be produced faster. Dryness of the eye surface stimulates reflex cranial nerves V and VII which produce excess tears [20]. This study is in accordance with previous research by Febrianti S and Bahri TS, the symptoms on the ocular surface that most predominantly occur in Nursing students at Syiah Kuala University are watery eyes for 196 (47%) respondents [21].

Headache symptoms were the third largest at 8.7%. Many headache complaints occur in students due to prolonged use of computers without resting their eyes. The distance between the eyes and the computer was closed, stress will appear. The International Headache Society states that one of the headache problems that are often experienced by computer users is TTH.

Tension-Type Headache (TTH) caused by uncomfortable posture while working can cause muscle tension, resulting in decreased work efficiency and social activities. Tension-Type Headache occurs due to excessive muscle contractions of the head and neck, these muscle contractions can be triggered by physical or psychological causes. Physically, muscle tension-type primary headaches can be caused by a sedentary head position for too long. Psychologically, stress and emotional conflict can cause tension-type headaches. The most common causes are head stays in one position for a long time such as typing or other computer work, poor sleeping position, using a microscope, and excessive work [22].

This eye complaint can occur in students due to the use of computers for a long time, which is more than 4 hours, the distance of computer operation that was too close or less than 5 cm, lack of computer and room lighting, resting eyes time less than 10 minutes and the absence of computer screen protectors. Based on the United States Occupational Safety and Health (OSHA) the recommended visibility when using a computer is 50-100 cm. When looking at a computer screen from a close distance (less than 50cm), the eye makes accommodations to focus. So, light falls precisely on the retina so that the object is clearly visible. Prolonged accommodated eyes cause ciliary muscle fatigue will result in vision complaints [23]. In line with Kenny's 2019 research, 79.6% of respondents who use computers with visibility of less than 50 cm experience CVS.24 In this study, there are 76% of respondents who had CVS complaints, (55.3%) used a computer with a distance

between the computer and the eyes below <50 cm.

Poor computer and room lighting will also raise CVS complaints. The illumination of the room is too bright and computer lighting accompanied by the absence of a light filter on the computer screen. The eyes will more glared. If environmental lighting is brighter than the brightness of a computer screen, it will affect 2 times experiencing CVS complaints than darker environmental lighting conditions [23]. In this study, there are 31.6% of respondents had lack computer screen lighting and room lighting with more brightness. Respondents who did not use a light filter about 92.1%.

The least CVS complaints were worst vision about 3.0% of respondents and hard focusing symptom on seeing close up was 3.3% of respondents. Worst vision with CVS results in uncorrected refractive disorders. Some of the respondents never had an eye or vision examination. Refractive uncorrected eyes caused by closer distances to the screen will affect stronger eye accommodation. Continuous accommodation causes ciliary muscle tone greater and the lens more convex. It is called myopia [24]. Hard eye focusing is a symptom caused by fatigue of the eye muscles that are too long accommodated when operating a computer. Room lighting in a work environment that is too bright can dazzle the eye and reduce the eye's ability on screen [23].

This research showed, there are 38 subjects, the most complaints were watery eyes 37(9.3%) respondents, and the least complaint was 12 (3.0%) respondents. The highest number of ages is 20 years old which

was 12 (31.6%) respondents. In the same way, the least age was 22 years old with 2 (5.3%) respondents. In the control and treatment group, the highest number of batches was the 2021 class of 13 (34.2%) respondents and the least batch was 2018, which was 7 people (18.4%).

Based on the results of univariate analysis in a control group of 19 respondents, 7 (36.8%) respondents experienced an increase in CVS symptoms. This happens because of the characteristics of women that have been stated earlier and several other factors, such as the duration of computer operation which is more than 4 hours, computer lighting, room lighting, unfiltered screen, eyes-computer distance below 50 cm, and restless eyes.

Poor lighting can also cause CVS complaints. The brightness of the room and minimum computer lighting accompanied by the absence of a light filter on the computer screen makes the eyes more glared. Environmental lighting that is brighter than the brightness of a computer monitor screen has 2 times at risk of experiencing CVS complaints compared to environmental lighting conditions that are darker than the brightness of a computer screen.²³ there are 7 respondents, 5 of them had darker computer screen brightness, and all of them did not use the light filter.

If the distance from the computer screen to the eye is less than 50 cm, the accommodation is greater for focusing. The light will fall precisely on the retina and the object will be more visible. It is caused by the ciliary muscle fatigue and vision complaints [23]. Research by Azkadina (2012) suggests

that length of rest is significantly associated with the incidence of CVS. Computer workers who take breaks for less than 10 minutes are more likely to suffer CVS than computer workers who take breaks for more than or equal to 10 minutes [13]. Most respondents operate computers at a distance below 50 cm. 4 respondents of them did not rest their eyes and 3 respondents, others rested their eyes under 10 minutes.

Control group respondents who had persistent symptoms 2 (10.5%) respondents. The observations showed that respondents rested their eyes for more than 10 minutes, one of them had a distance of more than 50 cm and both had good computer lighting. Respondents who experienced a decrease in CVS symptoms in the control group without doing eye exercise and acupressure were 10 people (52.6%).

Decreasing of CVS symptoms can be caused by several factors, for example room lighting, vision distance to the computer screen, the resolution of the computer screen used, the background of the computer screen, the colour of the reading text on the computer or the colour of the screen, the position of the eyes against the computer screen, and the habit of resting the eyes [25]. In line with the research of Stevani, et al. (2021), there are 17 (85%) respondents in the control group were found who after being given eye exercises experienced decrease in CVS symptoms. Next, there are 2 (10%) respondents who had CVS symptoms remained the same. Lastly, there are 1 (5%) respondent who experienced an increasing CVS symptom [25].

Univariate analysis showed, there are 18 (94) percent of respondents whom being

given eye exercises experienced a decrease in CVS symptoms, and 1 (5.2%) respondent who experienced an increase in CVS symptoms. Of the 19 other respondents, almost all of them experienced a decrease in CVS complaints. Therefore, it can be concluded that exercise and eye acupressure can reduce CVS complaints. In addition, respondents in this study also followed every eye gymnastics movement well so as to get good results. In Sugiarto's research in 2010 explained that eye gymnastics can make the surroundings eye muscles become elastic and strong, reduce strain on the eyes and more sharpen vision. Eye gymnastics will help the motility of the eyes become more trained and easier. After that, it will reduce stiffness. Eye exercise is a technique that can be applied on the eyeballs by flexing and moving regularly. Also, it will help eyes easier to become wider and focus when doing activities. The wider the eyes reach many things, the more effective to focus [14].

The Ministry of Health of the Republic of Indonesia, explained in general the benefits of acupressure are to reduce the intensity of pain in the body, reduce stress, and improve blood circulation [15]. Previous research by Hayashi, et al. in 2021 showed that 5-minute massage is an effective and easy method to improve vision. Thus, these findings suggest that a simple treatment allows for temporary recovery of eyestrain [26]. The average scores between pre-test and post-test of the control group decreased from 14.00 to 12.58 (difference value about 1.42)

The decreasing in CVS symptom scores can be influenced by several factors, such as eye vision distance to the computer screen,

resolution, background, colour of reading text, screen colour, eye position and eye resting habits. In accordance with previous research, Stevania, et al. (2021), there was a slight decrease in the average value in the pre-test and post-test control groups that's approximately 3,30 [25].

The pre-test and post-test average scores of treatments groups decreased from 16.32 to 7.05. In accordance with previous research by Stevania, et al. (2021) where there was a greater decrease in the average value of pre-test and post-test in the treatment group than in those who were not given eye gymnastics [25]. In a previous study by Nada Cindya, et al. (2021), there was a decreasing average value of the eye acupressure treatment group and no changes average value of CVS complaints from the group that did not get eye acupressure [7].

Statistically, there was no significant difference in pre-test and post-test CVS symptom scores $p = 0.216$ ($p > 0.05$) in control group. This is due to the absence of eye exercise and acupressure. In the treatment group, there are 18 (94%) respondents after being given eye exercises and acupressure experienced. The result was CVS symptoms decreased. Bivariate test showed value of $p = 0.000$ ($p < 0.05$). This result showed there were significant differences in the CVS scores of the pre-test and post-test treatment groups. It means there are effects of eye exercise and acupressure to reduce CVS symptoms of respondents.

The post-test difference between the treatment and control groups, p value = 0.006 or $p < 0.05$. So, it can be concluded that there are significant differences between the

treatment group and the control group. Therefore, the provision of eye exercise and acupressure have effects in reducing CVS symptoms. This study is in line with previous research by Intan Putri (2018) concluded that the effectiveness of eye exercise exercises on reducing symptoms of Computer Vision Syndrome [14]. It is also in line with N, Cindya (2019). In her research obtained p value $0.000 < \alpha (0.05)$. So, it can be concluded that acupressure treatment shows good effect to decrease Computer Vision Syndrome (CVS) symptom [6].

Eye exercise was proved to increase eye accommodation and also eye's capture. So, it is more flexible and relaxed. It can also make the eyes become more trained to move so as to reduce stiffness in the eye muscles [28]. The technique going to help the eyeball easier flexing and moving, because the wider the eye reach, the more effective focusing. The benefits of eye exercise are preventing eye diseases, tumours behind the eyes or in the pituitary (pituitary) gland, removing circles puffiness under the eyes, removing eye bags, reducing wrinkles around the eyes, making the eye muscles and surroundings elastic and strong, and sharpening vision [29-31]. This study is in line with previous research by Intan Putri (2018) concluded that the effectiveness of eye exercises on reducing symptoms of Computer Vision Syndrome [14].

Previous research by Hayashi, et al. in 2021 showed that a 5-minute massage is an effective and easy method to improve vision and these findings suggest that a simple treatment allows temporary recovery of eyestrain. Massage frequently has been

suggested to improve peripheral vessel function and blood flow, but such effects have not been reported in the ocular region. Acute massage applied using a roller increases blood flow in skin. Likewise, chronic massage improves blood flow and heat stimulation, possibly due to improved blood vessel function. Physical stimuli, such as pressure and abrasion, also increase blood flow [32]. Eye acupressure was effective in reducing Computer Vision Syndrome (CVS) symptoms [33][34].

LIMITATION

Based on this research process, there are some limitations that become important factors that need to be considered by future researchers in refining future research. Some limitations in the study are: more respondents are needed to describe the CVS more accurately, this research was conducted when trials and practices of acupressure and eye exercises were carried out online due to the COVID-19 pandemic situation.

The next researcher should carry out directly, it is recommended for high levels students to be more involved than new students, and in the process of data retrieval, the information provided by respondents through questionnaires sometimes does not show the actual opinion of respondents, this happens because sometimes the difference in thinking, assumptions and understanding are different from each respondent, as well as other factors such as factor of honesty in filling out the opinions of respondents.

CONCLUSION

The conclusion that can be drawn from the study "The Effect of Eye Gymnastics and Eye Acupressure on Computer Vision Syndrome (CVS) in Pre-Clinical Students of the Faculty of Medicine, University of Papua" is the effectiveness of eye gymnastics and eye acupressure on reducing symptoms of Computer Vision Syndrome. Statistically, the treatment and control post-test group showed p -value=0.006. The p -value was less than α -value=0.05. So, it can be concluded that there was a significant difference in the average CVS score after being given eye gymnastics and acupressure.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

REFERENCES

- [1] Darmaliputra K, Dharmadi M. Gambaran Faktor Risiko Individual Terhadap Kejadian Computer Vision Syndrome Pada Mahasiswa Jurusan Teknologi Informasi Universitas Udayana Tahun 2015. *E-Jurnal Med.* 2019;8(1):95-102. doi:ISSN: 2303-1395
- [2] Putri DW M. Hubungan Jarak Monitor, Durasi Penggunaan Komputer, Tampilan Layar Monitor, Dan Pencahayaan Dengan Keluhan Kelelahan Mata. *Indones J Occup Saf Heal.* 2018;7(1):1-10. doi:10.20473/ijosh.v7i1.2018.1-10
- [3] Sari FTA HR. Faktor Risiko Terjadinya Computer Vision Syndrome Risk Factors Occurrence of Computer Vision Syndrome. *Majority.* 2018;Vol.7 No.2(Maret):278-282. [https:// bapinismki.e-journal.id/jimki/article/view/50](https://bapinismki.e-journal.id/jimki/article/view/50)
- [4] Zhang Z, Xu G, Gao J, Wang L, Zhu Y, Li Z ZW. Effects of e-learning environment use on visual function of elementary and middle school students: A two-year assessment—experience from China. *Int J Environ Res Public Health.* 2020;17(5):1-19. doi:10.3390/ijerph17051560
- [5] Permana MA, Koesyanto H M. Faktor yang berhubungan dengan keluhan Computer Vision Syndrome (CVS) pada pekerja Rental Komputer di wilayah Unnes. *Unnes J Public Heal.* 2015;4(3):48-57.
- [6] N, Cindya, A, Anita, Reza Y NR. Teknik Kuratif Terhadap Computer Vision Syndrome (Cvs) Pada Siswa Menengah Kejuruan Komputer Melalui Akupresur Mata. *J Ners Indones.* 2019;10(1):94-102. doi:10.31258/jni.10.1.94-102
- [7] Cindya N NR, Bayhakki. Terapi Akupresur Mata Terhadap Gejala Computer Vision Syndrome (Cvs) Pada Mahasiswa. *BIMIKI (Berkala Ilm Mhs Ilmu Keperawatan Indones.* 2021;9(1):10-19. doi:10.53345/bimiki.v9i1.183
- [8] Sugarindra M AZ. Identifikasi Interaksi Manusia Dan Komputer Berbasis

- Computer Vision Syndrome Pada Unit Refinery Central Control Room. *Teknoin*. 2017;23(1):63-73.
- [9] Mersha GA, Hussen MS, Belete GT TM. Knowledge about Computer Vision Syndrome among Bank Workers in Gondar City, Northwest Ethiopia. *Occup Ther Int*. 2020;17:1-5. doi:10.1155/2020/2561703
- [10] Kharel S R KA. Knowledge, Attitude and practice of Computer Vision Syndrome among medical students and its impact on ocular morbidity. *J Nepal Health Res Counc*. 2018;16(40):291-296. doi:10.33314/jnhrc.v16i3.1177
- [11] Vikanaswari GI HA. the Screening of Computer Vision Syndrome in Medical Students of Udayana University. *Bali J Ophthalmol*. 2018;2(2):28-34. doi:10.15562/bjo.v2i2.20
- [12] Shantakumari N, Eldeeb R, Sreedharan J, Gopal K. Computer use and vision-related problems among university students in Ajman, United Arab Emirate. *Ann Med Health Sci Res*. 2014;4(2):258-263. doi:10.4103/2141-9248.129 058
- [13] Azkadina A. Hubungan Antara Faktor Risiko Individual Dan Computer Vision Syndrome. *Pendidik P, Kedokt S, Kedokt F, Diponegoro U*. 2012;5(2):16-19.
- [14] Arisandi IP, Utami GT NR. Efektivitas Senam Mata Terhadap Computer Vision Syndrome. *JOM FKp*. 2018;5(2):p.520-526.
- [15] Kementerian Kesehatan Republik Indonesia. Panduan akupresur mandiri bagi pekerja di tempat kerja. Published online 2015.
- [16] Kurmasela GP. Hubungan Waktu Penggunaan Laptop Dengan Keluhan Penglihatan Pada Mahasiswa Fakultas Kedokteran Universitas Sam Ratulangi. *J e-Biomedik*. 2013;1(1):291-299.
- [17] Hidayati RM, Bayhakki WR. Hubungan Durasi Penggunaan Laptop Dengan Keluhan Computer Vision Syndrome Pada Mahasiswa Psik U. *J Ners Indones*. 8(1):33-41. <https://jni.ejournal.unri.ac.id/index.php/JNI/article/view/6912/6114>
- [18] Apriyanti S, Sawitri E FN. Penggunaan Smartphone Berpengaruh Terhadap Gejala Computer Vision Syndrome. *J Sains dan Kesehat*. 2021;5(3):673-678.
- [19] Dotulong DJ, Rares LM NI. Computer vision syndrome. *e-CliniC*. 2021;9(1):20-25. doi:DOI: <https://doi.org/10.35790/ecl.9.1.2021.31707> n
- [20] Fauzi, L., Anggorowati, L., Heriana, C., Ilmu, J., Masyarakat, K., Semarang, U. N., Utama, M., Ibu, K., Reproduksi, A.-K., & Kuningan, S. (2016). Skrining Kelainan Refraksi Mata Pada Siswa Sekolah Dasar Menurut Tanda Dan Gejala. In *Journal of Health Education* (Vol. 1, Issue 1). <http://journal.unnes.ac.id/sju/index.php/jhealthedu/>
- [21] Febrianti S BT. Gejala Computer Vision Syndrome Pada Mahasiswa Keperawatan. *JIM FKEP*. 2018;3(3) :201-207.
- [22] R. NF. Pengaruh lama paparan monitor komputer terhadap insidensi nyeri kepala tipe tegang pada operator warnet. Niddy F R. Pengaruh lama paparan monitor komputer terhadap insidensi

- nyeri kepala tipe tegang pada operator warnet. karya tulis ilmiah. Universitas Mu. Published online 2012.
- [23] Nadia AS, Paramita A RA. Hubungan Durasi Penggunaan Komputer Portabel Dengan Kejadian Computer Vision Syndrome Pada Mahasiswa Fakultas Kedokteran Dan Ilmu Kesehatan Universitas Jambi Tahun 2020. *MEDIC.* 2021;4(1): 181-184.
- [24] Darmaliputra K DM. Gambaran Faktor Risiko Individual Terhadap Kejadian Computer Vision Syndrome Pada Mahasiswa Jurusan Teknologi Informasi. *E-JURNAL Med.* 2019;8(1):95-102. <https://ojs.unud.ac.id/index.php/eum>
- [25] Herryawan CL , Wahyuni I . Lestari P N. Pengaruh Kebiasaan Paparan Radiasi Blue Light Terhadap Kelainan Refraksi Mata Pada Mahasiswa Fakultas Kedokteran Universitas Airlangga Angkatan 2018. *JIMKI.* 2021;8(3):8-18.
- [26] Nau SV , Sagita S , Setiawan IMB AI. Senam Mata Menurunkan Computer Vision Syndrome (CVS) pada Mahasiswa Universitas Nusa Cendana. *FKUNC.* Published online 2021:95-109.
- [27] Hayashi N and DL. Acute and Chronic Periocular Massage for Ocular Blood Flow and Vision: a Randomized Controlled Trial. *Int J Ther Massage Bodyw.* 2021;14(2):5-13. Darmaliputra K, Dharmadi M. Gambaran Faktor Risiko Individual Terhadap Kejadian Computer Vision Syndrome Pada Mahasiswa Jurusan Teknologi Informasi Universitas Udayana Tahun 2015. *E-Jurnal Med.* 2019;8(1):95-102. doi:ISSN: 2303-1395
- [28] Gao, H., Zhang, L., & Liu, J. (2020). Auricular acupressure for myopia in children and adolescents: A systematic review. *Complementary Therapies in Clinical Practice, 38,* 101067. <https://doi.org/10.1016/j.ctcp.2019.101067>
- [29] Jun, J., Kapella, M. C., & Hershberger, P. E. (2021). Non-pharmacological sleep interventions for adult patients in intensive care Units: A systematic review. *Intensive and Critical Care Nursing, 67,* 103124. <https://doi.org/10.1016/j.iccn.2021.103124>
- [30] Lee, J. S., Hwang, S. H., Shin, B. C., & Park, Y. M. (2017). Electrical stimulation of auricular acupressure for dry eye: A randomized controlled-clinical trial. *Chinese Journal of Integrative Medicine, 23(11),* 822-828. <https://doi.org/10.1007/s11655-016-2449-6>
- [31] Zhuang, Z., Cui, Y., Cai, G., Liu, K., Wang, H., Jia, K., ... Guo, S. (2022). Clinical Efficacy of Auricular Acupressure plus Eye Exercises in the Treatment of Adolescent Pseudomyopia. *Evidence-Based Complementary and Alternative Medicine, 2022,* 1-5. <https://doi.org/10.1155/2022/920847>.
- [32] Holladay, J. T. (2004). Visual acuity measurements. *Journal of Cataract and Refractive Surgery, 30(2),* 287-290. <https://doi.org/10.1016/j.jcrs.2004.01.014>
- [33] Glimne, S., Brautaset, R., & Österman, C. (2020). Visual fatigue during control room work in process industries. *Work,*

65(4), 903-914.
<https://doi.org/10.3233/WOR-203141>
[34] Hayashi, N., Ikemura, T., & Someya, N.
(2011). Effects of dynamic exercise and
its intensity on ocular blood flow in
humans. *European Journal of Applied*

Physiology, 111(10), 2601-2606.
<https://doi.org/10.1007/s00421-011-1880-9>.