

***The Effect of Eye Gysing On Complaints
Computer Vision Syndrome Impact of Online Learning***

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Abstract

Computer Vision Syndrome (CVS) was a collection of complaints that are felt by the eye. The current pandemic requires all students to study at home using cellphones/laptops to facilitate the learning process. The results of a preliminary study conducted at MAN 1 Bandung, there were 8 out of 10 students who experienced complaints such as sore eyes, tired eyes and headaches. Efforts to reduce complaints can be done with eye exercises. The purpose of the study was to determine the effect of eye exercise on CVS complaints due to online learning in class XI MAN 1 Bandung. This study was a quasi-experimental study with a non-equivalent control group design with a population of 261 students and a sample of 29 experimental respondents and 28 control respondents. The results of the Wilcoxon test on the score of CVS complaints before and after the intervention was given to the experimental class showed a p-value of $0.000 < \alpha 0.05$, so H_0 was rejected. And the results of the Mann Whitney test of $0.040 < \alpha 0.05$, it can be concluded that there is an effect of eye exercise on CVS complaints in students. It is expected that students can practice eye exercises regularly in order to reduce complaints.

Keywords: Computer Vision Syndrome, online learning, eye exercises

INTRODUCTION

In accordance with the circular from the Ministry of Education and Culture regarding learning during the pandemic, namely SE Mendikbud No. 4 of 2020 regarding education policies during the COVID-19 pandemic. Learning from home is a challenge and a new learning experience for students. Learning from home or Distance Learning (PJJ) in a network (online) and using a cell phone or computer through several online learning applications (Kemendikbud, 2020). Along with online learning has an impact on students' vision. The impact of PJJ by using mobile phones or computers continuously allows students to experience decreased vision (Kartini et al., 2021).

Data from the World Health Organization (WHO) shows that there are 2.2 billion people with visual impairments, and almost half of them can be prevented (World Health Organization (WHO), 2021). The prevalence of severe low vision or impaired vision function

in Indonesia for productive age (15-54 years) has a visual acuity of less than 6/18, which is 1.49% with a blindness prevalence of 0.5% (Kementrian Kesehatan RI, 2018).

Computer Vision Syndrome (CVS) is a problem with the sense of sight that causes several symptoms and is caused by excessive use of cell phones/computers. The main cause of CVS is eye fatigue (P2PTM Kemenkes RI, 2019). Eye fatigue is caused by eye muscle tension, where the eyes are forced to see small objects, at close range and for a long time. Efforts that can be made to reduce eye fatigue include reducing lighting on cell phones/computers, resting the eyes for a moment and doing eye exercise tricks. How to reduce visual fatigue can be by doing the "20-20-20" Eye exercise tricks. These steps are to rest your eyes every 20 minutes, focus your eyes on a point as far as 20 feet (6 meters) for 20 seconds, reduce bright lights on computer screens, televisions and devices as low as possible. Increase the size of the text by using the zoom function or using a reading magnifier or a book with larger text if the text is too small. Eye relaxation can also be done by rubbing the palms of the hands and then placing the warm palms on the closed eyelids accompanied by gently massaging the two temples (P2PTM Kemenkes RI, 2018). An easy eye exercise step is to position the body in a relaxed manner. Rub the palms together until they feel warm and then place the palms on the closed eyelids for about 2 minutes. This step aims to reduce muscle tension around the eyes when doing eye exercises. Then open your eyes wide, roll your eyes both up and down and left and right for 2 seconds then close your eyes slowly. Repeat several times when in a relaxed state (Quamila, 2020).

Ease of access to mobile phones/computers, makes most people feel at home spending hours in front of the screen and forget to rest. Without realizing it, spending hours in front of a monitor screen can lead to health problems, both physical and mental health (Muchtar & Sahara, 2016). With learning activities from home using cell phones/computers and getting easy access, students do not only use cell phones/computers to study (Manumpil et al., 2015). Based on research conducted by Intan Putri et al regarding the effectiveness of eye exercise on CVS, it was found that there was an effectiveness of eye exercise on reducing CVS symptoms (Arisandi et al., 2018). The results of research from Megawati et al regarding the relationship between laptop use behaviour and CVS events found that there was a significant relationship between laptop use behaviour and CVS events (Anggraeni et al., 2018). Previous research has been carried out on wigs making workers who work with high accuracy so that they are at risk of straining the eye muscles and causing eye fatigue. Eye exercise reduces eye fatigue in wigs workers with a significant difference in the average eye fatigue in the treatment group and the control group by 9.412 ($p < 0.05$) (Maisal et al., 2020).

Based on a preliminary study that has been carried out by 21 students of class XI in 3 SMA/MA, namely 3 students of SMAN 1 Ciparay, 8 students of Madrasah Aliyah Ciparay and 10 students of MAN 1 Bandung. There were 4 students in 3 SMA/MA who did not complain of eye fatigue and the rest complained of eye fatigue. There are 7 students of MA Ciparay who experience eye fatigue. The most students who experienced complaints of eye fatigue were students of MAN 1 Bandung as many as 8 students of whom complained of eye fatigue such as sore eyes, pain in the eye area and headaches. This study aims to determine "The Effect of Eye Gymnastics Against Complaints of Computer Vision Syndrome Due to Online Learning in MAN 1 Bandung students".

METHOD

Research is a type of quantitative research with the aim of looking at the relationship between variables in a population. Quasi-experimental design uses a Non-equivalent Control Group Design approach. This approach aims to see the causal effect of comparing the results of the group that was given the intervention (experimental) with the group that was not given the intervention (control). The research has been carried out at Madrasah Aliah Negeri (MAN) 1 Bandung, which is located in Ciparay District, Bandung Regency. Based on the results of a preliminary study that has been carried out at MAN 1 Bandung, it is found that almost all students experience eye fatigue and require prevention to avoid damage to the eyes and decrease student achievement. The time of the research was carried out in August 2021.

The population in this study were all students of class XI MAN 1 Bandung consisting of 9 classes with a total population of 261 students. The sampling technique used in this study is a non-random sampling technique, namely the purposive sampling technique, where the selection of this sample is carried out based on certain considerations (Notoatmojo, 2018). The consideration and selection suggested by the students of MAN 1 Bandung by looking at the inclusion criteria, the research samples were two social studies classes. The inclusion criteria are students who are willing to be respondents and students who do not use glasses. After carrying out these considerations, the researcher chose 2 classes to be used as research samples. The two classes are IPS 1 and IPS 2, the grouping of classes that will be used as the control class is IPS 2 and IPS 1 as the experimental class. The research sample in this study was 57 students.

The following are the steps for doing eye exercises according to the Directorate of Health Promotion and Community Empowerment, including the following;

1. Sit on a chair with a straight body and head straight forward as comfortable as possible. Inhale hold for 3 seconds, exhale slowly. Do this inhale for 3 times.
2. Rub your palms together so they feel warm, put them on your eyes for 15 seconds. So that the eyes feel more relaxed.
3. Close both eyes, then massage the eyelids slowly. Do this for 10 seconds.
4. Move the eyeball in a clockwise circle, repeat 5 times, close your eyes and relax. Then do the same thing counterclockwise.
5. Move the eyeball up and down, repeat up to 5 times, close your eyes and relax.
6. Move the eyeball to glance right and left, repeat up to 5 times.
7. Blink 5 times.
8. Direct your eyes to look at close objects for 10-15 seconds and focus your gaze. Change your vision to a more distant object, focus your gaze on it for 10-15 seconds.
9. Inhale again and hold for 3 seconds, exhale slowly. Do it 3 times.
10. Rub your palms together so they feel warm, put them on your eyes for 15 seconds. So that the eyes feel more relaxed.
11. Finally, close your eyes for 1 minute to rest your eyes (Direktorat Promosi Kesehatan & Pemberdayaan Masyarakat, 2017).

RESULTS AND DISCUSSION

The research that has been carried out was attended by 57 students of class XI MAN 1 Bandung. Sources of data obtained from the results of pretest and posttest regarding the effect of eye exercise on complaints of computer vision syndrome in class XI MAN 1 Bandung. This can determine the type of statistics to be performed in future analyses. The normality test used in this study is in line with Hermawati (2016), namely if the number of samples is equal to or more than 50 samples, the analysis that is considered more appropriate is Kolmogorov-Smirnov (Herawati, 2016).

Eye exercise was carried out between the implementation of the pretest posttest as an intervention in the case group. After the pretest and posttest results were obtained, then the data was tested for normality to determine whether the data distribution was normal or not. Based on the results of the normality test using the Kolmogorov-Smirnov test, it was found that the p-value (sig.) of the experimental class pretest data was $0.005 < 0.05$, it was said that the experimental class pretest data was not normally distributed. The experimental class posttest data also got $0.000 < 0.05$, so it is said that the experimental class posttest data is not normally distributed. For the control class pretest data of $0.001 < 0.05$, it is said that the control class pretest data is not normally distributed and the control class posttest data gets $0.009 < 0.05$ then it is said that the data is not normally distributed. All data that have been tested for normality indicate that the data are not normally distributed, so to test the hypothesis using non-parametric statistical tests.

Table 1
CVS Complaints Before and After Eye Gymnastics is given

CVS Complaint	Experiment Class		Control Class	
	n	%	n	%
Before being given Eye Gymnastics				
Eyestrain	13	13	13	14
Eyes are burning	0		0	
Itchy eyes	12	12	11	12
Watery eyes	5	5	4	4
Red eye	4	4	2	2
Excessive blinking	1	1	3	3
Eyelids feel heavy	7	7	7	7
Painful Eyes	8	8	4	4
Dry Eyes	7	7	8	8
Blurred Vision	8	8	7	7
Double Vision	3	3	1	1
Deteriorating Vision	1	1	1	1
Difficult to Focus	11	11	11	12
Sensitive to Light	9	9	12	13
Colored Circle in Object area	2	2	1	1
Headache	10	10	10	11

After being given Eye Gymnastics				
Eyestrain	11	22	15	16
Eyes are burning	0		0	
Itchy eyes	9	18	12	13
Watery eyes	2	4	1	1
Red eye	0		3	3
Excessive blinking	1	2	1	1
Eyelids feel heavy	5	10	10	11
Painful Eyes	3	6	2	2
Dry Eyes	7	14	8	9
Blurred Vision	2	4	7	8
Double Vision	0		0	
Deteriorating Vision	0		0	
Difficult to Focus	2	4	11	12
Sensitive to Light	3	6	13	14
Colored Circle in Object area	0		1	1
Headache	5	10	7	8

Before the eye exercise was performed, it turned out that the most complaints from tired eyes were 13 students, which is shown in table 1. The least complaint was the worsening vision, namely 1 student and the complaint that was not complained at all was burning eyes in each group. class. Itchy eyes and difficulty focusing are complaints that many students experience before doing great exercise. In the section after the eye exercise was performed, it showed that after the eye exercise intervention was given, there was a decrease in complaints felt by the experimental class. While in the control class there were some complaints that increased. The most common complaints experienced by students are tired and itchy eyes in the experimental class group totaling 11 students and 15 students in the control class group, meaning that it has decreased by 25%.

Table 2
CVS Incidence Before and After Giving Eye Exercises

<i>Computer Vision Syndrome</i>	Experiment Class		Control Class	
	n	%	n	%
Before being given Eye Gymnastics				
CVS (+)	19	62,1	17	60,7
CVS (-)	10	37,9	11	39,3
After being given Eye Gymnastics				
CVS (+)	16	55,2	19	68
CVS (-)	13	44,8	9	32
TOTAL	29	100	28	100

Before being given eye exercise, the results of CVS events (+) or those who experienced more than one complaint in the experimental class were 19 respondents (62.1%), while in the control class there were 17 respondents (60.7%). For the incidence of CVS (-) which did not

experience any complaints by respondents in the experimental class, there were 10 respondents (37.9%) and in the control class there were 11 respondents (39.3%). The incidence of CVS (+) in the experimental class group after the eye exercise was given was 16 respondents and in the control class there were 19 respondents. While the incidence of CVS (-) in the experimental class group amounted to 13 respondents and 9 respondents in the control class. There was a decrease in the incidence of CVS (+) and an increase in the incidence of CVS (-) in the experimental class (Table 2).

Table 3
Wilcoxon Test Results Analysis of CVS Complaints

Score CVS	Experiment n = 29				
	Median	Std. Deviation	Min	Max	p
Experiment Class Group					
Before Intervention	3,50	3,302	0	12	0,000
After Intervention	1,00	2,043	0	8	
Control Class Group					
Before Intervention	4,00	3,059	0	10	0,248
After Intervention	4,00	2,863	0	9	

In the experimental class group, the results of statistical analysis using the Wilcoxon test obtained a median value before being given an intervention of 3.50 with a standard deviation of 3.302. Meanwhile, the median value after the intervention was 1.00 with a standard deviation of 2.043. The range of CVS complaints scores before the intervention was a minimum of 0 and a maximum of 12, after being given the intervention there was a decrease in the range of CVS complaints scores, namely a minimum value of 0 and a maximum of 8. The p-value (sig) obtained a result of 0.000, because the value of <0.05 then H_0 is rejected and there is a difference in the result scores between before and after the eye exercise intervention. The results of the Wilcoxon test for CVS complaints before and after the intervention in the form of eye exercise in the control class, obtained the median value before being given the intervention of 4.00 with a standard deviation of 3.059. Meanwhile, the median value after the intervention was 4.00 with a standard deviation of 2.863. The range of CVS complaints scores in the control class before the intervention was a minimum of 0 and a maximum of 10, after being given the intervention there was a decrease in the range of CVS complaints scores, namely a minimum value of 0 and a maximum of 9. The p-value (sig.) obtained from the Wilcoxon test results for CVS complaints on control class of 0.248. Because the value of >0.05 , H_0 is accepted, it can be concluded that there is no difference in the results of CVS complaints scores between before and after the intervention was given to the control class (Table 3).

The results of the Mann Whitney test obtained a p-value in the post-test group of the experimental class and the control class group of 0.040 where the p-value <0.05 , then H_0 was rejected, it can be concluded that there is a significant difference between the experimental class group and the control class group (Table 4).

Table 4
Results of the Mann Whitney Test Analysis of CVS Complaints After being given Eye Exercises in the Experimental Class and Control Class

Class	n	Median	Std. Deviation	p
Experimental Class	29	1.00	2.043	0,040
Control Class	28	4.00	2.863	

The experimental class and control class often experience complaints such as tired eyes, itchy eyes, watery eyes, sore eyes, headaches and blurred vision so they can't focus on online learning. However, after the eye exercise intervention was given to the experimental class, the CVS complaints that were complained of were not as severe and as numerous as the previous complaints. This is in line with research conducted by Febri et al (2020), that complaints of eye fatigue decreased when wig workers were given eye exercises (Maisal et al., 2020).

All respondents in this study use mobile phones to conduct online learning. Mobile phone monitor screens are smaller than laptop or computer monitor screens. Because the cellphone monitor screen is small, it requires more accommodation power to see objects on the screen (Fernanda & Amalia, 2018). Most of the respondents in this study spent 4-6 hours staring at the cellphone screen continuously in one day. Respondents who experienced CVS complaints were 35 respondents from 57 respondents.

The results of the Wilcoxon test in the experimental class of 29 respondents, there were 19 respondents whose complaints were smaller than the pretest results. This proves that the 19 respondents did eye exercises. While the other 10 respondents got the same posttest results as the pretest results. This can happen if the respondent does not do eye exercises and also because the duration of using cellphones in the experimental class exceeds the normal limit.

Someone who stares at the cellphone screen for more than or equal to 4 hours continuously will be more at risk of experiencing CVS complaints and suffering from CVS, compared to people who spend less than 4 hours staring at the cellphone screen continuously. In line with research by Irma et al. (2018), which shows that the duration of computer use >2 hours, PLN employees who use computers experience eye fatigue as many as 21 out of 35 people (Irma et al., 2019). When a person stares at a cellphone monitor focusing their vision on the monitor for a long time, the eye muscles contract and result in fatigue and blurred vision. This condition will worsen complaints and can cause health problems (Permana et al., 2015).

The results of the Wilcoxon test in the control class showed that out of 28 respondents, there were 8 respondents whose posttest scores were smaller than the pretest scores. There were 4 respondents who experienced an increase in their posttest results, while the other 16 respondents had the same posttest results as the pretest results. This is shown in table 4. This happened because the control class did not receive intervention in the form of eye exercises, resulting in respondents experiencing increased complaints. And because the visibility and

body position when using a cellphone can be a risk for someone experiencing this CVS complaint.

The results of this study indicate that 42 respondents out of 57 respondents use mobile phones at a close distance. And respondents who experienced CVS complaints were 35 respondents. Most of the respondents did not apply the ergonomic position when using mobile phones during online learning. This is in line with the research of Melati et al (2015), that there is a relationship between eye visibility and CVS complaints in computer rental workers. According to Denis R (2006) in Melati (2015) states that, when a person sees an object at a close distance, the eye lens is able to thicken and focus on a near target. If done for a long time, it can cause eye muscle strain and eye fatigue (Permana et al., 2015). This is in line with research by Rachmah et al (2018), which shows that workers who work with a work object distance of <30 cm (near) will be at risk of experiencing eye fatigue 15 times (Utami et al., 2018). Control in human activities is needed to reduce the negative impacts that occur as an effort to maintain the health of workers. This is in accordance with Iffah (2018) where the combination of adding lead shielding for luggage fluoroscopy machines as far as 1.5 m can reduce screening workers' eye fatigue by 68.85% and setting a distance of 2 meters can reduce radiation exposure to the eyes by 89.79% (Iffah, et.al., 2018).

According to the results of this study, it is known that there is a difference between before and after the intervention in the form of eye exercises. The results of statistical analysis using the Wilcoxon test in the experimental class obtained a p-value of 0.000, where $p\text{-value} < (0.05)$, so it can be concluded that there is a difference in the score of CVS complaints before and after the intervention in the form of eye exercises in the class experiment. In line with the research of Nurrohmah et al (2020), stated that there was a difference in the score of eye fatigue before and after the eye exercise intervention was given to the experimental group (Nurrohmah et al., 2020). Meanwhile, based on the Wilcoxon test in the control class, a p-value of 0.248 was obtained where $p\text{-value} > (0.05)$ so that it can be concluded that there was no difference between the scores before and after the eye exercise intervention in the control class.

The researcher assumes that, by giving eye exercise intervention, it can reduce the complaints experienced by respondents compared to respondents who do not get an eye exercise intervention. According to the results of the Man Whitney test in the experimental class and control class, the p-value of $0.040 < 0.05$ so that there is a significant difference, it can be concluded that there is an effect of eye exercise on CVS complaints in class XI students of MAN 1 Bandung in 2021. This is because because the respondent carried out the eye exercises that had been given.

The results of this study are in line with research conducted by Ratna Indah et al (2020) which obtained the results of $p\text{-value} = 0.000 (p < 0.05)$, it can be concluded that there is an effect of doing eye yoga exercises on eye fatigue on the work of computer users in the Padang Editorial Division. Express 2019 (Dewi & Novia, 2020).

According to Nurrohmah (2020), eye exercises are used as an intervention in reducing CVS complaints because apart from being easy, eye exercises also do not require a special place to do them, eye exercises can be done alone and do not need to cost money nor do it take a long time to complete do so (Nurrohmah et al., 2020). Eye exercise is a way to get the eyeballs accustomed to being flexible and moving according to reach so they don't experience eye strain. The benefits of eye exercise in addition to reducing CVS complaints, eliminating eye bags and

also reducing wrinkles in the eye area which makes the eye muscles strong and can sharpen vision (Arisandi et al., 2018).

Febry's research in 2020, it is said that six eyes can reduce the level of eye fatigue in wigs workers (Maisal et al., 2020). There is an effect of eye exercise on CVS complaints in students because by doing eye exercises, it trains the eye muscles so that they are not stiff and not tense because they stare at the cellphone monitor for too long, so they can sharpen students' eyesight to focus on online learning. The incidence of CVS experienced by respondents was due to being in front of a cellphone monitor too long at a distance that was too close so that the eye muscles became tense and could experience various CVS complaints.

CONCLUSION

The effect of eye exercise on complaints of computer vision syndrome due to online learning in class XI MAN 1 Bandung in 2021 is that there is a decrease in CVS complaints in students. There are differences in complaints before and after being given eye exercises in the experimental class group, while in the control class there is no difference in complaints before and after being given eye exercises.

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