

Effect of Eye Exercises on Computer Vision Syndrome among Medical Students of Universitas Sumatera Utara, Indonesia

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Abstract

Objective: To determine the effect of eye exercises on Computer Vision Syndrome among batch 2019 medical students of the Faculty of Medicine, Universitas Sumatera Utara, and Indonesia.

Methods: This study used analytical true experimental with a Pretest-Posttest Control Group Design. Sample consisted of 86 respondents who were divided into two groups: control and experimental (intervention) groups. Each group consisted of 43 respondents who were sampled randomly using the simple random sampling technique. Data were collected through the Computer Vision Syndrome Questionnaire (CVS-Q) and analyzed using a statistical software application with a p-value of < 0.05 considered significant.

Results: A decrease in the score of Computer Vision Syndrome in the experimental (intervention) group after the eye exercise was observed with a p-value of 0.001 (<0.05).

Conclusion: Eye exercise has an effect on the Computer Vision Syndrome.

Keywords: Computer vision syndrome, eye exercise

Introduction

Computer Vision Syndrome (CVS) is a complex eye discomfort condition in the form of visual impairment symptoms caused by prolonged exposure to digital displays.¹ Globally, it is estimated around 60 million people and one million new cases occur annually.² The pathophysiology was divided into three mechanisms: ocular mechanism, related to dryness and redness of eyes are reduction in blink rate; visual mechanism cause blurring of vision, double vision and slowness of focus change; extraocular mechanism, associated with non-ergonomic posture in front of computer screen cause musculoskeletal symptoms such as headaches and shoulder pain.³ The COVID-19 pandemic poses a risk of increasing cases of Computer Vision Syndrome due to changes in environment for study because of the implementation of the online learning methods policy.⁴ Garg *et al* reported more than 70% of medical students at Rama University, India spent more than 4 hours

using computers. About 40% of students learn about CVS but only 10% take CVS precautions.⁵ Another study by Muma *et al.* of 348 students in Kenya, showed the prevalence of CVS was 60,4% with a low level of knowledge about CVS was 46,8% and those who didn't take preventive measures was 40%. It showed that student's prevention efforts against CVS are still relatively low.

Eye exercises can be considered as a non-pharmacological therapy to prevent and reduce symptoms of Computer Vision Syndrome. Eye exercises therapy is a series of movement performed repeatedly by the eyes to train our eye muscles and its surroundings to be elastic and strong, relax the eyes as to reduce discomfort in the eyes.⁶

Study by Intan Putri *et al.* regarding the effectiveness of eye exercises on CVS in nursing students of Riau University, it was concluded that there was a significant difference in the decrease of CVS scores in the experimental group after eye exercises intervention.⁷ In connection with problems above, the purpose

of this study is to determine the effect of eye exercise on reducing and preventing Computer Vision Syndrome complaints in medical student of Universitas Sumatera Utara during online learning during COVID-19 pandemic with different types of eye exercise, and subjects. Researcher selected several types of eye exercises that can be implemented effectively both in time and place. Eye exercises in this study were carried out twice a week, for one month, with a duration of approximately 10 minutes and can be done anywhere without using an object.

Methods

This research is a quantitative study with a true experimental design and a pre-and post-test design. In this design, two groups were randomly selected, Samples was divided into two groups (control and intervention). The intervention group was given eye exercises, while the control group was not given an intervention. Each group was asked to fill CVS-Q one day before doing eye exercises and one day after the last day of doing eye exercises. This study was performed from September to October 2022. The sampling technique used is the simple random sampling technique with a total sample of 86 medical students of Universitas Sumatera Utara who met the inclusion and exclusion criteria. The inclusion criteria were medical students who use computers at least 4 hours a day and willing to be the subject of the research, whereas the exclusion criteria were medical students that do not agree to be participate in the study. Computer Vision Syndrome score data obtained from filling out CVS-Q (Computer Vision Syndrome-Questionnaire) from Segui *et al.* pre-and-post eye exercises. Ethical approval for this study has been granted by the Health Research Ethical Committee, Faculty of Medicine, Universitas Sumatera Utara, with 797/KEPK/USU/2022.

Eye exercises in this study were carried out twice a week, for one month, with a duration of approximately 10 minutes. Each eye exercises sessions involves the following steps in sequence: blinking, palming, figure of eight, eye movements, 20-20-20 rules, near and far focus.

The following are steps for doing eye exercises: (1) Sit on a chair with straight body and head straight forward as comfortable as possible; (2) Blink 1-2 times every 10 seconds;

(3) Rub your palms together to warm them up, put them on your eyes and breathe deeply for 1 minute; (4) Then focus on an area on the floor around 8 feet away, and move the eyes in the shape of a figure 9. Trace the imaginary figure of 8 for 30 seconds, then switch direction; (5) Move the eyeball right and left, repeat 3 times; (6) Move the eyeball up and down, repeat 3 times; (7) Move the eyeball in a clockwise circle and counterclockwise, repeat 3 times; (8) Direct your eyes to look at something 20 feet away for 20 seconds, every 20 minutes; (9) Last, positioning your fingers a few inches away from the eyes, then focus your gaze on your fingers. Move your fingers away and slowly point them back closer to eyes.

Sample measurement was determined using the Wilcoxon test. Secondary data for individual characteristic was obtained from age and gender.

Results

Characteristic was obtained from 86 respondents who were divided based on gender, age. Data regarding individual characteristic can be seen in the following table.

Based on Table 1, the respondents in this study were mostly women and was dominated by respondent from age 21 years old because they are working on a thesis which increase their usage of computers.

Table 2 and Fig. 1 shows there are three symptoms that respondents complained the most before and after intervention were headache, tearing, and itching.

Based on Table 3, experimental group p value = 0,001 ($p < 0,05$) so it can be concluded that eye exercise caused a significant decrease in CVS score in experimental group while control group showed a p value = 0,802 which means that it didn't show a significant decrease in CVS score. Two respondents in experimental group showed an increase in CVS score after

Table 1 Individual Characteristic

Variable	n=86
Ages (years)	
20	27 (31.4)
21	53 (61.6)
22	6 (7)
Sex	
Female	66 (76.7)
Male	20 (23.3)

Table 2 Computer Vision Syndrome Symptoms Before and After Intervention

Symptoms	Before intervention	After intervention
	n=86	n=86
Burning	25 (29)	20 (23.2)
Itching	74 (86.1)	61 (70.9)
Feeling of a foreign body	67 (77.9)	43 (50)
Tearing	75 (87.2)	64 (74.4)
Excessive blinking	34 (39.6)	29 (33.7)
Eye redness	57 (66.3)	43 (50)
Eye pain	60 (69.8)	48 (55.9)
Heavy eyelids	47 (54.6)	40 (46.6)
Dryness	54 (62.8)	52 (60.5)
Blurred vision	60 (69.8)	48 (55.9)
Double vision	27 (31.4)	21 (24.4)
Difficulty focusing for near vision	32 (37.2)	19 (22.1)
Increase sensitivity to light	47 (54.7)	36 (41.9)
Colored halos around objects	21 (24.5)	14 (16.3)
Feeling that sight is worsening	43 (50)	32 (37.2)
Headache	77 (89.5)	67 (77.9)

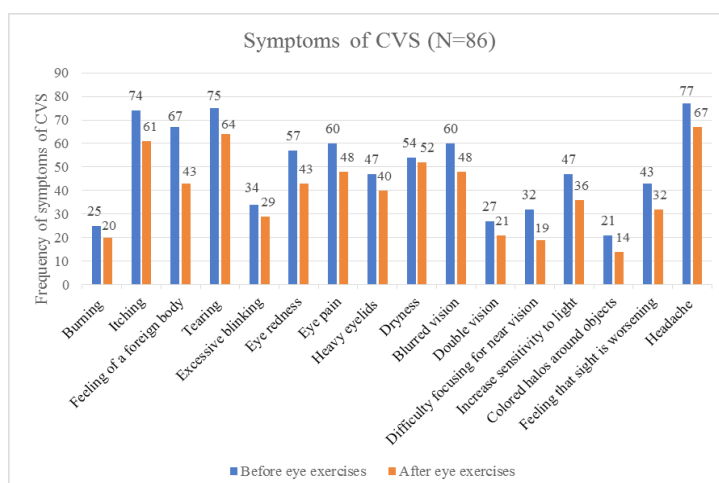


Fig 1. Symptoms of CVS

Table 3 Wilcoxon Test Analysis between Control and Experimental Group

Ranks	Group	
	Control (n=43)	Experimental (n=43)
Negative ranks ^a	17	2
Positive ranks ^b	25	37
Ties ^c	1	4
p Value	0.802	0.001

Note: * a. (score (pre) < (score (post)); b. (score (pre) > (score (post)); c. (score (pre) = (score (post))

intervention, whereas in control group there were 17 respondents who experienced an increase in CVS score.

Discussion

Computer and VDT(Visual Display Terminal) have become an essential part of modern lifestyle, hence the term “Computer Vision Syndrome” appears associated with prolonged use of VDT. Therefore, by doing eye exercises could help to prevent and reduce the occurrence of Computer Vision Syndrome. Distribution frequency of symptoms pre-andp-post intervention, headache, tearin, and

itching are the most complaints symptoms by participants. However, there was a decrease in the number and percentage of symptoms post-intervention compared to pre-intervention. The result of this study supported with study by Ranasinghe and Altalhi which also show that the most complained symptoms is headache.^{8,9}
¹⁰ Excessive tear production of watery eyes is not directly related to the duration of VDT use, but is an increased reflex in the eye to increase tear production¹¹.

The result of Wilcoxon test in experimental group obtained a p value =0,001 (p<0, 05). Thus, it can be concluded that there was an effect of eye exercises on reducing the CVS score in the intervention group. This research show a similar result that there is a significant decrease in CVS score on intervention groups after eye exercises^{7,12}. A significant relationship in this study due to the obedience of the respondents in following each eye exercise properly and routinely twice a week in a month.

Eye exercises are proven able to improve vision and the performance of muscular and motor activities of the eyes. Palming helps to relax the ocular muscles and all sensory nerves related with vision. Eye movements and figure of eight help the eyes muscle to controlling back and movement of eye's lens, to achieve sight at multiple distances¹³. Blinking replenishes the tear film by redistributing tears from the lacrimal glands and lipids from meibomian glands on the surface of eye¹⁴. In conclusion, there is an effect of eye exercise to Computer Vision Syndrome. This research can be used as a reference for the effect of eye exercise to Computer Vision Syndrome. However, this study has limitations, such as the lack of number of respondents and short period of eye exercises, which leads to less data variation. If this research is continued, it would be better to add the number of respondents, extend the period eye exercises or using other types of eye exercises, in order to get more representative research results.

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