



CORRESPONDENT

Chita Widia

Email: chitawidia@universitas-bth.ac.id

Orcid ID: 0000-0002-3999-487X

ORIGINAL ARTICLE

DOI: 10.30989/mik.v12i1.881

Page: 93-101

Article accepted: 23th March 2023

Revised article: 29th March 2023

Article approved: 31th March 2023

Media Ilmu Kesehatan published by Universitas Jenderal Achmad Yani Yogyakarta, Indonesia.

Licensed open article: CC-BY-SA.

Keywords

20-20-20 method

Visual symptoms

Computer vision syndrome

Kata Kunci:

Metode 20-20-20

Gejala visual

Sindrom penglihatan komputer

An effective way to prevent visual disturbances due to Computer Vision Syndrome (CVS)

Cara Efektif Untuk Mencegah Gangguan Visual Akibat Computer Vision Syndrom (CVS)

Chita Widia^{1*}, Siti Zahara Rapida², Hanna Nurul Husna³, Anih Kurnia⁴, Eli Kurniasih⁵

^{1,4,5}Nursing Diploma Program, ^{2,3}Optometry Diploma Program Health Sciences Faculty Bakti Tunas Husada University, Jl.. Cilolohan No.36 Tasikmalaya, email: chitawidia@universitas-bth.ac.id, sitizahararapida123@gmail.com, hannanurulhusna@universitas-bth.ac.id, anikhurnia@universitas-bth.ac.id, elikhurniasih@universitas-bth.ac.id, Indonesia

ABSTRACT

Background: Working too long with computers, including laptops, desktops, tablets and other display devices (such as smartphones and other electronic reading devices) for 3 hours continuously can increase the risk of eye health problems, one of these is Computer Vision Syndrome (CVS). One of the symptoms is visual symptoms, which consist of blurred vision and double vision **Objective:** This study intends to determine the effect of applying the 20-20-20 method on preventing visual symptoms of CVS. **Methods:** The research method used is a quantitative analytic method with a cross-sectional design. **Results:** The results of statistical analysis using the Wilcoxon test found that visual symptoms complaints after and before the application of 20-20-20 had an Asymp Sig value (2 tiles) Of 0,005. The hypothesis in this study was accepted that there was a significant effect of the intervention 20-20-20 method because the value was $0.005 < 0.05$. **Conclusion:** The effective way to prevent visual symptoms of CVS is implementing 20-20-20 method.

ABSTRAK

Latar Belakang: Bekerja terlalu lama menggunakan laptop, desktop, tablet, dan perangkat display lainnya (seperti smartphone dan alat baca elektronik lainnya) selama 3 jam terus menerus dapat meningkatkan risiko gangguan kesehatan mata, salah satunya adalah Computer Vision Syndrome (CVS). Salah satu gejalanya adalah gejala visual, yang terdiri dari penglihatan kabur dan penglihatan ganda **Tujuan:** Penelitian ini bermaksud untuk mengetahui pengaruh penerapan metode 20-20-20 terhadap pencegahan gejala visual CVS. **Metode:** Metode penelitian yang digunakan adalah metode analitik kuantitatif dengan rancangan cross sectional. **Hasil:** Hasil analisis statistik dengan menggunakan uji Wilcoxon didapatkan keluhan gejala visual setelah dan sebelum penerapan 20-20-20 memiliki nilai Asymp Sig (2 petak) sebesar 0,005. Hipotesis dalam penelitian ini diterima bahwa terdapat pengaruh yang signifikan dari metode intervensi 20-20-20 karena nilainya $0,005 < 0,05$. **Kesimpulan:** Cara efektif untuk mencegah gejala visual akibat CVS adalah dengan menerapkan metode 20-20-20.

INTRODUCTION

Computers were created activities and starting in the 21st century are used in almost all human activities. This activity of using a computer can actually cause work-related illnesses. Computer monitor screens not only display images and text but also emit radiation waves that cannot be detected by the eye such as (UV) and X-rays that can cause physiological disturbances to the eyes, head, or other body parts.¹

Computer Vision Syndrome (CVS) is a complex eye and vision problem associated with computer use, consisting of a variety of symptoms that occur due to prolonged use of computers, tablets, mobile phones, or other electronic devices. This is one of them characterized by visual symptoms caused by interaction with a computer screen or the environment because the visual demands on the task exceed the individual's visual ability for comfortable task performance.²

Signs and symptoms of CVS include asthenopia, ocular surface-related symptoms, visual symptoms, and extraocular symptoms. Asthenopia is a condition of eye strain or eye fatigue caused by long-term near vision. is due to fatigue of the ciliary and extraocular muscles as a result of long-term accommodation in near vision. Other causes are dryness of the eyes due to exposure of the cornea when looking straight and a decrease in blinking frequency due to work focus. Symptoms of asthenopia consist of headache, difficulty focusing, sore eyes, and

heavy and painful eyes. Symptoms related to the ocular surface include dry eyes and irritated eyes. This is because when using a computer, the frequency of blinking decreases, the eyes are focused on the monitor, and the ocular movement is also limited. Visual symptoms consist of blurred vision and double vision. Blurred vision can be caused by refractive errors, incorrect lens prescription, presbyopia, unclear monitor, eye position when looking at the screen that is not good, and glare. Double vision in computer users who are too long is caused because the eye muscles fail to converge and focus on the object. Extraocular symptoms consist of neck pain, back pain, and shoulder pain. This is due to the adjustment of body position to reduce the burden on the visual system.³

CVS is caused by a decreased blink reflex when working for long periods of time and focusing on a computer screen. The normal frequency of flashing is 16 - 20 times per minute. Blinking frequency decreased to 6 - 8 times per minute in workers who use computers. Focusing on seeing at close range for a long time forces the ciliary muscle in the eye to work harder. Individuals aged around 30-40 years complain of an inability to focus on near objects after working for a short time, which ends in a decrease in the accommodation focusing mechanism of the eye and presbyopia.⁴

The American Optometrist Association (AOA) conducted a survey in 2004, the results of the survey show that more than 10

million eye examinations per year in the United States are carried out for vision problems by the use of electronic devices. Data from the World Health Organization (WHO) states that the incidence of Computer Vision Syndrome (CVS) in 2004 ranged from 40-90% in workers who are active in front of the computer. Another study states that the current condition in Yogyakarta is that young people who use gadgets to play online games are in the high category. This is a condition that is a high risk for experiencing visual complaints.^{5,6}

Management of CVS includes prevention and treatment. One of the prevention education for CVS is the application of the 20-20-20 rule, while CVS treatment uses artificial tears. The 20-20-20 method is that every 20 minutes in front of the computer, the eyes are rested by closing their eyes for 20 seconds, or the eyes are rested by looking at a distance of 20 feet (6 meters).⁷

The description above is the background of the author to conduct a study entitled the effective way to prevent visual symptoms due to Computer Vision Syndrome. Research conducted on Nursing Diploma Program's Student Health Sciences Faculty Bakti Tunas Husada University.

METHODS

Study design

A cross-sectional study was conducted to evaluate the effectiveness of

the 20-20-20 method to prevent visual symptoms due to CVS on Nursing Diploma Program's Student Health Sciences Faculty Bakti Tunas Husada University.

Questionnaire design

The data collection tool in this study was using a questionnaire. The course of the research is as follows:

1. Initial preparation
 - a. Determining the title and topic
 - b. Prepare and take care of the relevant permits or those required for research
 - c. Request approval for research on Nursing Diploma Program's Student Health Sciences Faculty Bakti Tunas Husada University.
2. Research implementation
 - a. Determine the sample that fits the criteria.
 - b. Identify usage activities before applying the 20-20-20 method.
 - c. Provide questionnaires to respondents regarding the symptoms of Digital Vision Syndrome.
 - d. Provide education about the 20-20-20 method on the use of gadgets to respondents.
 - e. Identifying gadget use activities after applying the 20-20-20 method.
 - f. Provide questionnaires to respondents regarding the symptoms of Digital Vision Syndrome after applying the 20-20-20 method.
3. Analyze the data that has been obtained by using the gadget.

4. Reporting research results.

Data Analysis

Data analysis in this study consisted of univariate analysis and bivariate analysis. The univariate analysis aims to describe or explain the characteristics of each research variable. The data for this category will be seen in the frequency distribution with the size of the proportion and percentage and then presented in the form of a narrative table. Bivariate analysis was carried out to see the influence between the independent variable (method 20-20-20) and the dependent variable Visual Symptoms.⁸

Calculation using normality test. If the data is normally distributed then use the Chi-Square test and if the data is not normally distributed then use the Wilcoxon test. The Wilcoxon test was used to see whether the 20-20-20 method was effective in preventing the appearance of visual symptoms due to CVS on Nursing Diploma Program's Student Health Sciences Faculty Bakti Tunas Husada University. In this statistical test, it is used with a 95% confidence level and a significance value of 5% ($\alpha = 0.05$), so that the value at $p < 0.05$ then the statistical test is called "meaningful" and if $p > 0.05$ then the result of the calculation is "meaningless".

1. If the value of Sig. [2-tails] < 0.05 then H_0 is rejected and H_1 is accepted, which means that there is an effect of applying the 20-20-20 method on preventing visual

symptoms of CVS to students who use gadgets.

2. If the value of Sig. [2-tails] > 0.05 then H_0 is accepted and H_1 is rejected, which means that there is no effect of applying the 20-20-20 method on method on preventing visual symptoms of CVS to students who use gadgets.

RESULTS AND DISCUSSION

1. Univariate Analysis

A. The frequency distribution of respondents who experienced DVS complaints before applying the 20-20-20 method can be seen in table 1.

Table 1 Frequency distribution of respondents experiencing visual symptoms before applying the method 20-20-20

Experiencing Complaints of Visual Symptoms	Frequency	Percentage
Yes	27	79,4 %
No	7	20,6%
Amount	34	100%

Table 1 shows that the majority of respondents experienced complaints of visual symptoms before applying the 20-20-20 method, as many as 27 people (79.4%), and respondents who did not experience as many as 7 people (20.6%).

B. The frequency distribution of respondents who experience visual symptom complaints after applying the 20-20-20 method can be seen in Table 2

Table 2 Frequency Distribution of Respondents who Complaints of Visual Symptoms After Applying the Method 20-20-20

Experiencing Complaints of Visual Symptoms	Frequency	Percentage
Yes	16	47,1 %
No	18	52,9%
Amount	34	100%

Table 2 shows that the majority of respondents experienced complaints of visual symptoms after applying the 20-20-20 method, as many as 16 people (47.1%), and respondents who did not experience as many as 18 people (52.9%).

2. Data Normality Test

Table 3 Normality Test Table for Visual Symptoms Complaints Data Before and After Implementation of the Method 20-20-20

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Complaints of Visual Symptoms Before Implementation 20-20-20	.086	34	.000	.498	34	.000
Complaints of Visual Symptoms After Implementation 20-20-20	.353	34	.000	.636	34	.000

Table 3 statistical test results of the Normality Test show that the Asymp Sig of visual symptom complaints before the application of the 20-20-20 method is worth 0.000 and the Asymp Sig of visual symptom complaints after the application of 20-20-20 is 0.000. Because the value of 0.000 <0.05, it is

concluded that the data is not normally distributed.

3. Bivariate Analysis

A. Wilcoxon analysis

The results of the analysis of the effectiveness of the application of the 20-20-20 method to prevent complaints of visual symptoms based on the presence or absence of complaints experienced before and after the implementation of the method can be seen in table 4.

Table 4 Table of Wilcoxon Analysis Results, Complaints of Visual Symptoms Before and After Implementation of the Method 20-20-20

		N	Mean Rank	Sum of Ranks
Complaints of Visual Symptoms Before Implementation 20-20-20	Negative Ranks	13 ^a	8,00	104,00
	Positive Ranks	2 ^b	8,00	16,00
	Ties	19 ^c		34
Complaints of Visual Symptoms After Implementation 20-20-20				
Total				

Table 4 shows that the negative difference between before and after implementation of the 20-20-20 method is 13. Indicates a reduction or decrease in the number of respondents who experience complaints of visual symptoms from before implementing the 20-20-20 method to the value after implementing the 20-20-20 method. The positive difference between before and after the implementation of the 20-20-20 method was 2, meaning that 2

people experienced changes from before and after the implementation of the 20-20-20 method. The similarity value (ties) is 19, which means 19 respondents still have complaints of visual symptoms even though they have implemented the 20-20-20 method.

B. Statistical Analysis

The results of statistical analysis can be seen in table 5.

Table 5 Statistical Test	
Complaints of Visual Symptoms Before Implementation 20-20-20	
Complaints of Visual Symptoms After Implementation 20-20-20	
Z	-2,840 ^b
Asymp. Sig. (2-tailed)	,005

Table 5 shows the results of statistical tests showing that Asymp Sig (2 tiles) is worth 0.005. Because of the value of 0.005 < 0.05, it is concluded that the hypothesis is accepted. This means that there are differences in the results of the number of respondents who experience complaints of visual symptoms before and after the implementation of the 20-20-20 method. There is an effect of using the 20-20-20 method to prevent complaints of visual symptoms due to CVS on Nursing Diploma Program's Student Health Sciences Faculty Bakti Tunas Husada University. This is mean that the 20-20-20 method effective in preventing complaints of visual symptoms due to CVS.

This study describes the average results of visual symptom complaints before and after using the 20-20-20 method which is used as a reference that the method is effective in preventing complaints of visual symptoms due to CVS on Nursing Diploma Program's Student Health Sciences Faculty Bakti Tunas Husada University. The data in this study were obtained from the results of questionnaires to respondents. This method helps relieve complaints of visual symptoms due to CVS experienced by computer users. The 20-20-20 trick is every 20 minutes of work, resting for 20 seconds by focusing your eyes on an object as far as 20 feet (6 meters).⁹

The results of the study in table 1 can be seen that the number of respondents in this study amounted to 34 students who experienced severe complaints (>2 symptoms) before applying the 20-20-20 method as many as 27 people (79.4) and who did not experience complaints of visual symptoms due to CVS. before applying the 20-20-20 method to as many as 7 people (20.6), while table 2 who experienced complaints of visual symptoms due to CVS after applying the 20-20-20 method to as many as 16 people (47.1) and who did not experience complaints of visual symptoms due to CVS after applying the 20-20-20 method as many as 18 people (52.9). This is in accordance with research of Reddy, 2013 based on the results of the study it was found that 90% of students in Malaysia who use

computers for more than two hours continuously experience CVS symptoms more often.¹⁰

Symptoms of CVS are symptoms that are not permanent. Symptoms of CVS include headaches, eye strain, blurred vision, dry eyes, tired eyes, red eyes, eye pain, burning sensation in the eyes, wrist or finger pain, back pain, neck and shoulder pain, and double vision. This CVS complaint can disappear if the user no longer uses the gadget for too long. Regular rest has a very big influence in preventing CVS for users of gadgets or monitor screens.⁹

The American Optometric Association (2017) argues that CVS or computer vision syndrome is a collection of symptoms or disorders of eye health and vision caused by the eyes being too focused on working in front of computers (laptops or PCs) or other digital devices such as tablets and cellphones. The CVS American Optometric Association (2017) recommends that you always take a 20-second break every 20 minutes of working on a computer. During breaks, computer users are encouraged to focus their eyes on an object as far as 20 feet (6 meters) or close their eyes. This intervention is commonly called the 20-20-20 trick and has been shown to be effective in reducing CVS symptoms in computer users.⁹

Students' non-compliance in applying this intervention could possibly be due to students being too focused when using gadgets so students forget to apply the 20-

20-20 method when using gadgets. Low levels of self-awareness often make students who use gadgets not aware of the discomfort or occurrence of symptoms associated with CVS.

The results of statistical analysis using the Wilcoxon test obtained complaints of visual symptoms due to CVS after and before the application of 20-20-20 there was an Asymp Sig value (2 tiles) of 0.005 because the value of 0.005 was more than 0.05, the hypothesis in this study was accepted that there was a significant effect. from the intervention of the 20-20-20 method on the incidence of complaints of visual symptoms due to CVS in student gadget users at Bakti Tunas Husada University. This is in accordance with previous research conducted by Anggrainy, 2018 entitled The effect of the 20-20-20 trick intervention on reducing symptoms of Computer Vision Syndrome in Medan Class I Port Health Office employees in 2018, in this control group study there was no significant difference. A significant score of CVS incidence between the initial examination and the final examination in employees.⁹

Rosenfield said that CVS can affect work productivity between 64% to 90%. This syndrome occurs due to prolonged use of the computer. Computer vision syndrome, also known as digital eye strain, is a combination of eye and vision problems associated with the use of computers (including desktops, laptops, and tablets) and other electronic

displays (e.g. smartphones and electronic reading devices).¹¹

Internal ocular symptoms such as eye strain, pain in and around the eyes, and eye fatigue are most likely related to refractive errors such as accommodation, increased convergence (reading at close range), and involvement of other ocular muscle tensions. Abnormalities and accommodation disorders have a significant contribution to CVS symptoms experienced by computer users. Taking frequent breaks while using a computer has been shown to increase work efficiency because rest tends to relax the eye's accommodative system thereby reducing eye fatigue and headache.¹²

Rest continuously and regularly is very influential in overcoming this symptom. During rest, the ciliary muscles relax, the eyes are not in a state of accommodation, the blinking frequency increases, and the muscles in the neck and shoulders relax, so that ocular, visual and musculoskeletal complaints will decrease.¹³

The role of a refractive optician is very important in the maintenance of vision (vision care). In order to prevent CVS from occurring, the optometrist advises digital users, especially those who frequently use gadgets. In order to limit the time of using gadgets by applying the 20-20-20 method. This means that digital users are required to be in front of the gadget screen every 20 minutes by shifting their gaze to objects as far as 20 feet (6 meters) for 20 seconds,

adjusting the lighting of the gadget screen so that it is not too bright, adjusting the room lighting so that the room light is not too dark, using anti-glare glasses. -reflective, blink often to prevent dry eyes, use an anti-glare screen on the gadget screen to reduce light reflexes, and adjust the distance and placement of gadgets with a distance of at least 30 cm from the eyes and 15-20 degrees below the eye level, adjust posture sitting, doing eye examinations at least every 6 months.³

The results of this study are in line with the results of research (14,15) which states that applying the 20-20-20 rule routinely can help reduce CVS symptoms

CONCLUSION

This study aims to determine the effect of the application of the 20-20-20 in preventing visual symptoms due to CVS. 27 people complain visual symptom before applying the method, after applying it, the number of respondents who experience complaints of visual symptoms due to CVS is 16 people.

There is an effect before and after the application of the 20-20-20 method on complaints of visual symptoms due to CVS in students who use gadgets at Nursing Diploma Program Health Sciences Faculty Bakti Tunas Husada University.

Asymp Sig (2 tiles) with a value of 0.005, it's mean that the 20-20-20 method is

an effective way to prevent visual symptoms due to CVS.

ACKNOWLEDGMENTS

1. Tanendri Arizkiani, MSi, Head of LPPM, Bakti Tunas Husada University, 0265-334740, email: lppm@universitas-bth.ac.id
2. Teti Agustin, SKp., MKep, Head of Nursing Diploma Program Health Sciences Faculty Bakti Tunas Husada University, email: agustinteti@gmail.com

REFERENCES

1. Widia C, D. A. Hubungan Durasi Penggunaan Gadget terhadap Prevalensi Astigmatisme. *Jurnal Keperawatan Komprehensif (Comprehensive Nursing Journal)* 2021;7 (1): 27-31.
2. Anshel, J. *Visual Ergonomics Handbook*. New York, USA: CRC Taylor & Francis Group; 2013
3. Amalia, H. Computer Vision Syndrome. *Biomedika Dan Kesehatan* 2018; 1 (1): 117-118.
4. Garg, A.et.al. Instant clinical diagnosis in ophthalmology anterior segment. Jaypee brothers medical publishers; 2008.
5. Suci Febrianti, dkk. Gejala Computer Vision Syndrom Pada Mahasiswa Keperawatan. *JIM FKEP* 2018; III (3): 201-207.
6. Masta Hustasoit, Herian A. (2019). Perilaku Remaja Bermain Online Game Di Yogyakarta. *Media Ilmu Kesehatan* 2019; 8 (1): 33-37.
7. Bambang Subakti Zulkarnain, et.al. The effect of 20-20-20 Rule Dissemination and Artificial Tears Administrations in High School Students Diagnosed with Computer Vision Syndrome. *Indonesian Journal og Community Engagement* 2021; 7 (1): 24-29.
8. Sugiyono. *Metode Penelitian Kuantitatif*. Bandung: Alfabeta: 2019
9. Anggrainy, P. Pengaruh Intervensi Trik 20-20-20 Terhadap Penurunan Gejala Komputer Vision Syndrome pada Pegawai Kantor Kesehatan Pelabuhan Kelas 1 Medan. *Repositori Institusi USU* 2018
10. Reddy, S. L. Computer Vision Syndrome: A Study of Knowledge and Practices in University Students. *Nepal J Ophthalmol* 2013: 161-168.
11. Rosenfield, M. Computer Vision Syndrome: A Review of Ocular Causes and Potential Treatments. *Ophthalmic and Physiological Optics* 2011: 502-515.
12. Gowrisankaran, A. S. *Computer Vision Syndrome: A Review*. IOS Press Content Librar; 2014
13. Wimalasundera, S. *Computer Vision Syndrome: Ophthalmic and Physiological Optics*; 2006
14. Rawalven Purba.dkk. Pengaruh Intervensi Trik 20-20-20 Terhadap Penurunan Gejala *Computer Vision Syndrom* Pada Mahasiswa Fakultas Kesehatan Masyarakat Institut Kesehatan Deli Husada. *BEST Journal (Biology, Education, Science & Technology) Fakultas Keguruan dan Ilmu Pendidikan* 2021; 4(2):274-279
15. Bambang Subakti, Z. et.al. The Effect Of 20-20-20 Rule Dissemination and Artificial Tears Administration in High School Students Diagnosed with Computer Vision Syndrom. *Journal of Community Engagement* 2021; 7(1): 24-29.