Effectiveness of Methods 20-20-20 Preventing Visual Symptoms Due to Computer Vision Syndrome in Nursing Diploma Programme Students at Bakti Tunas Husada University

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Abstract
Computer Vision Syndrome (CVS) is one of the health problems in the eye, which is a collection of symptoms that occur due to working too long with computers, including laptops, desktops, tablets and other display devices (such as smartphones and other electronic reading devices). 3 hours continuously increases the risk of CVS. This study intends to determine the effect of applying the 20-20-20 method on CVS to student gadget users at STIKes BTH Tasikmalaya. The research method used is quantitative analytic method with cross sectional design. The results of statistical analysis using the Wilcoxon test found that DVS complaints after and before the application of 20-20-20 had an Asymp Sig value (2 tailed) of 0.005, because the value was 0.005 <0.05, the hypothesis in this study was accepted that there was a significant effect of the intervention 20-20-20 method on the incidence of CVS in students who use gadgets at STIKes BTH Tasikmalaya. There is a significant effect from the implementation of the 20-20-20 method on the incidence of CVS in student gadget users at STIKes BTH Tasikmalaya. The 20-20-20 method is effective in preventing CVS.

Keywords:
Method 20-20-20, Visual Symptoms, Computer Vision Syndrome
Introduction

Computers were created to help human 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 (Chita Widia, 2021).

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 (Anshel, 2005).

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. This 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 (Amalia, 2018).

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 (Garg, 2008).

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 (Suci Febrianti, 2018).

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) (Bambang Subakti Zulkarnain, 2021).

The description above is the background of the author to conduct a study entitled the effectiveness of the 20-20-20 method to prevent visual symptoms due to Computer Vision Syndrome in Nursing Students of STIKes BTH Tasikmalaya.
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 in D III Nursing students of STIKes Bakti Tunas Husada Tasikmalaya.

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 students at STIKes BTH Tasikmalaya
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 (Sugiyono, 2019).

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 in D III Nursing students of STIKes Bakti Tunas Husada Tasikmalaya. In this statistical test, it is used with a 95% confidence level and a significance value of 5% (α = 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 H0 is rejected and H1 is accepted, which means that there is an effect of applying the 20-20-20 method on Digital Vision Syndrome to students who use gadgets at STIKes BTH Tasikmalaya.
2. If the value of Sig. [2-tails]> 0.05 then H0 is accepted and H1 is rejected, which means that there is no effect of applying the 20-20-20 method on Digital Vision Syndrome to students who use gadgets at STIKes BTH Tasikmalaya.
Result

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 1.1: Frequency distribution of respondents experiencing visual symptoms before applying the method 20-20-20

<table>
<thead>
<tr>
<th>Experiencing Complaints of Visual Symptoms</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27</td>
<td>79.4%</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>20.6%</td>
</tr>
<tr>
<td>Amount</td>
<td>34</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Experiencing Complaints of Visual Symptoms</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>16</td>
<td>47.1%</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>52.9%</td>
</tr>
<tr>
<td>Amount</td>
<td>34</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Complaints of Visual Symptoms</th>
<th>Kolmogorov-Smirnova</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Implementation 20-20-20</td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td></td>
<td>.086</td>
<td>34</td>
</tr>
<tr>
<td>After Implementation 20-20-20</td>
<td>.353</td>
<td>34</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Complaints of Visual Symptoms</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Implementation 20-20-20</td>
<td>13</td>
<td>8,00</td>
<td>104,00</td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>2</td>
<td>8,00</td>
<td>16,00</td>
</tr>
<tr>
<td>Ties</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>-2.840&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.005</td>
</tr>
</tbody>
</table>

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 in D.II Nursing students at STIKes Bakti Tunas Husada Tasikmalaya. This means that the 20-20-20 method is effective in preventing complaints of visual symptoms due to CVS.

Discussion

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 in students who use gadgets at STIKes BTH Tasikmalaya. 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) (Anggrainy, 2018).
The results of the study in table 4.1 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 4.2 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 (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.

Symptoms of CVS are symptoms of the eye 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 (Anggrainy, 2018).

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 (Reddy, 2013).

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 STIKes BTH Tasikmalaya. 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.

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) (Rosenfield, 2011).

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 headaches (Gowrisankaran, 2014).

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 (Wimalasundera, 2006).
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 (Amalia H., 2018).

**Conclusion**

This study aims to determine the effect of the application of the 20-20-20 method on complaints of visual symptoms due to CVS in student gadget users at STIKes BTH Tasikmalaya. 20-20-20 is eye fatigue for as many as 27 people, after applying the 20-20-20 method 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 STIKes BTH Tasikmalaya Asymp Sig (2 tiles) with a value of 0.005. The 20-20-20 method is effective in preventing visual symptoms due to CVS.

**Acknowledgement**

Alhamdulillah, with the permission of Allah this research can be completed on time. Thank you to all parties involved in this research for their support and good cooperation.
References