

The Correlation between Anxiety and Blood Pressure Changes in Administering Computer-Based Competency Test of Ners Students

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ABSTRACT

The study aimed to determine the correlation between anxiety and changes in blood pressure in administering the Ners Students computer-based Competency test. The study used a sphygmomanometer to measure blood pressure and used a HARS tool for anxiety. The research design used is a quasi-experimental method with a non-equivalent pretest-posttest design. The analysis method uses quantitative analysis of chi-square correlations and dependent T-test statistical tests. The results showed no significant association between the anxiety facing computer-based competency tests and changes in students' blood pressure, as evidenced by a $p = 0.216$. There was a significant difference in the average score between anxiety before and after taking the computer-based test $p = 0.042$. There was no significant difference on average between blood pressure before and after taking the computer-based competency exam $p = 0.231$. This research concluded that the anxiety experienced by students in taking competency exams does not affect changes in blood pressure.

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1. INTRODUCTION

Blood pressure is an essential factor in the human body's circulatory system. Blood pressure fluctuates or can change quickly, influenced by many causes ranging from physical activity, lack of rest, food and drink intake, or psychological factors, both anxiety, stress, and others. The condition of a sudden increase in blood pressure is a state of blood pressure measurements slightly above the standard threshold. The sudden rise in blood pressure is known in medicine as hypertension. Prehypertensive conditions can turn into hypertension if not controlled immediately.

Blood pressure is the force of blood pushing against the walls of your arteries in the circulatory system. Hypertension is the most common disease, but mostly it is undiagnosed until it is measured several times. Hypertension is high blood pressure with a systolic blood pressure of 140 mmHg or more and diastolic blood pressure of 90 mmHg or more consistently when measured twice at a 5-minute

interval with appropriate rest (Anna Palmer, 2007; Ministry of Health, 2018; Solfaine, 2021). In the expert's opinion, it can be concluded that hypertension is a condition of blood pressure above average $> 120 \text{ mmHg} / 80 \text{ mmHg}$, which can affect vital organs of the body.

Hypertension can kill silently, with 10.4 million deaths each year. At least 45 percent of deaths from heart disease and 51 percent of deaths from stroke are caused by hypertension. The prevalence of hypertension has been widely recorded in various parts of the world. In 2025, the number of adults with hypertension is expected to rise by roughly 60%, to 156 billion (154–158 billion). Globally, hypertension is expected to increase to over 29% by 2025, with low and middle-income nations accounting for more than 80% of deaths from hypertension and related cardiovascular illnesses (Haldar, 2013; Kearney et al., 2005; Desta et al., 2020; Unger et al., 2020)

Based on the previous explanation, anxiety is one factor that affects the occurrence of hypertension. Anxiety is an emotional reaction that is felt individually and judged subjective by a person and transmitted among people without any particular object. Anxiety is chaos, the fear of something happening for no apparent reason, and is associated with anxiety and helplessness. Anxiety can be demonstrated through physiological reactions, and the body responds with the activation of the sympathetic and parasympathetic nervous systems. The sympathetic nervous system activates the body's response, and the parasympathetic nervous system minimizes the body's response. The body's reaction to fear is "fight or flight." When the cerebral cortex is stimulated, it is sent through the sympathetic nerves to the adrenal glands, releasing the hormone epinephrine (adrenaline), which stimulates the heart and blood vessels to deepen breathing, increase pulse rate, and raise blood pressure (Pramana, 2016; Istiana et al., 2021).

Anxiety that a person feels arises due to several conditions such as worry, fear, anxiety, and anxiety, with various physical diseases and health problems. In addition, things that usually occur during the exam period among students due to excessive anxiety include lack of sleep, lack of exercise, changing diet, fear of facing exams, etc.

Based on the results of interviews conducted by the researchers with 20 students who had taken the competency test, it obtained that there were 80% of the students expressed their anxiety and worried about taking the competency test because it is a requirement for completing their studies at university and a compulsory requirement to obtain a registration certificate (STR) as well. STR is a requirement to obtain a license of practice. If students do not pass the competency test, they will not get STR and will not have a license to practice in health.

The anxiety and worry experienced by students need to get special attention. If not treated, it will increase blood pressure. Research conducted by Kartika showed significant changes in blood pressure before and during osoca exams in medical students. This study focused on knowing the correlation between anxiety and changes in blood pressure in students taking exams.

The study aimed to find out the categories and averages of anxiety in conducting the computer-based competency test, to identify changes in blood pressure of Ners students in administering a computer-based competency test, and to know the effect of anxiety in administering a computer-based competency test on changes in blood pressure of Ners students at University Pahlawan.

2. METHODS

This research is part of an experimental research design using quasi-experiment methods with non-equivalent pretest-posttest designs. The sample in this study must be observed first before being given treatment, then after being given treatment, the sample is observed again.

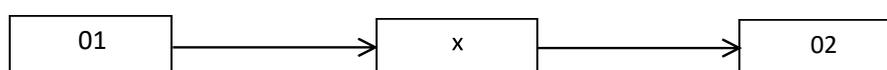


Figure 1 Research design

01: Blood pressure measurement and anxiety measurement before competency exam (pre-test)

02 :P blood pressure and anxiety measurements after competency test (post-test)

X: Intervention (Computer-based competency exam)

The study used bivariate chi-square analysis to investigate the correlation between anxiety and the changes in blood pressure of Ners students at University Pahlawan. Statistical analysis of the dependent T-test was used to determine the difference in the average of the students' anxiety before and after administering the competency exam and the difference in the students' blood pressure before and after administering the competency exam. The population in this study was 50 students, or all Ners students who had taken the competency test in November 2021. Students in this study are active students in the last semester of 2021-2022. The sampling technique used was purposive sampling. The number of samples that fit the inclusion and exclusion criteria and were willing to be the respondents was 22 students. The data collected in the study was quantitative data on respondents' blood pressure before and after taking the computer-based competency exam. Blood pressure measurement instruments are used as a sphygmomanometer. Students' blood pressure was measured twice. First, blood pressure is measured before students take the competency exam. Second, blood pressure is measured after the student completes the competency exam. The anxiety level measurement data were obtained through the HARS anxiety measurement tool. The HARS scale is used to determine the level of anxiety, mild, moderate, severe, or severe. This measuring instrument consists of 14 groups of symptoms; each group is detailed with more specific symptoms. Each group of symptoms receives a score of 0-4, which means: 0 = no anxiety at all, 1 = mild symptoms, 2 = moderate symptoms, 3 = severe symptoms, 4 = severe symptoms. Each of the values of the number (score) of the 14 groups of symptoms is summed, and from the sum results, the degree of anxiety of a person, namely: a. Score < 14 = no anxiety, b. Score 14 - 20 = mild anxiety, c. Score 21 - 27 = moderate anxiety, d. Score 28 - 41 = severe anxiety, e. Score 42-56 = Panic (Wahyudi et al., 2019). All data paired for pre-test and post-test data. The data were analyzed using SPSS version 23, starting from the data normality test, variable univariate test, correlation test, and T-test.

3. FINDINGS AND DISCUSSION

The data analysis techniques used in this study are descriptive statistical analysis and inferential statistical analysis. Data processing for descriptive statistical analysis in this study uses Microsoft Excel and SPSS version 22 for Windows programs. Descriptive statistical analysis is conducted to explain student anxiety before and after taking the competency exam, exposing students' blood pressure before and after taking the competency exam. To find out the relationship between anxiety and blood pressure, a chi-square analysis test was used. To compare anxiety before and after taking competency exams and compare blood pressure before and after competency tests are used dependent T-tests.

The results of the effect of anxiety in Administering Computer-Based Competency Test on changes in blood pressure of Ners students in 2021 are as follows:

Normality Testing

The normality test is intended to show that the data were normally distributed. Several techniques can be used to test the normality of data; In this case, the researchers used the Kolmogorov-Smirnov Tests.

Table 1. Data normality test results

		One-Sample Kolmogorov-Smirnov Test	
		PreTestKecemasa n	PostTestKecemasan
N		22	22
Normal Parameters ^{a,b}	Mean	10.6818	4.9091
	Std. Deviation	9.45358	7.13081
Most Extreme Differences	Absolute	.179	.278
	Positive	.176	.278
	Negative	-.179	-.246
Kolmogorov-Smirnov Z		.841	1.304
Asymp. Sig. (2-tailed)		.480	.067
a. Test distribution is Normal.			
b. Calculated from data.			

Table 1 shows the normality test results of the Kolmogorov-Smirnov test by using SPSS version 23, with a significant value of > 0.05 . If the value of Asymp. Sig. (2-tailed) > 0.05 means normally distributed data. Based on the data in the table, it can be seen that the value of Asymp. Sig. (2-tailed) = 0.480. It can be concluded that the data is normally distributed.

Frequency distribution of student anxiety levels before and after computer-based competency test

The following are explained about the categories of anxiety used in this study, namely; Score < 14 = no anxiety, Score 14 - 20 = mild anxiety, Score 21 - 27 = moderate anxiety, Score 28 - 41 = severe anxiety, Score 42-56 = Panic (Wahyudi et al., 2019). Students' anxiety data is taken before they take the competency exam. Their anxiety data before the exam is displayed in table 2.

Based on table 2, it can be shown that from 22 students, there are 17 people (77.3%) had no anxiety, 2 people (9.1%) experienced mild anxiety, 2 people (9.1%) experienced moderate anxiety, and 1 person (4.5%) has severe anxiety.

Table 2 Distribution of anxiety levels before computer-based competency test

	Frequency	Percentage (%)
No emergency	17	77.3
Mild anxiety	2	9.1
Moderate emergency	2	9.1
Severe anxiety	1	4.5
Severe anxiety/panic	0	0
Total	22	100.0

The second stage of anxiety data was taken after the student took the competency exam. The results of the anxiety data are shown in table 3.

Table 3 Distribution of anxiety levels after computer-based competency test

	Frequency	Percentage (%)
No emergency	20	90.9
Mild anxiety	2	9.1
Total	22	100.0

Based on table 3, it can be known that out of some 22 students, there are 20 people (90.9%) with no anxiety, and 2 people (9.1%) experience mild anxiety.

Average Distribution of Respondents' Anxiety Before and After Taking Computer-Based Exam

After the measurement of student anxiety before and after the exam is done, the data is processed to find out the average anxiety of students before and after taking the competency exam. The average student anxiety can be seen in table 4.

Tabel 4 Average Distribution of Respondents' Anxiety Before and After Taking Computer-Based Exam

Variable	Mean	SE	SD	n	P-Value
Pre-exam anxiety	10.6818	2.01551	9.45358	22	.042
Post exam anxiety	4.9091	.52029	7.13081		

The study results found that the average anxiety of respondents before administering the computer-based competency test was 10.6818, with a standard deviation of 9.45358. Thus, the results of the average respondents' anxiety after administering the exam was 4.9091, with a standard deviation of 7.13081. The mean difference between the respondents' anxiety before and after the exam was 5.77273, with a standard deviation of 12.49736. The results of the statistical test obtained a value of $p = 0.042$. It can be concluded that there is a significant difference on average between the respondents' anxiety before and after administering the computer-based exam.

Distribution of student blood pressure frequency before and after computer-based competency test

The following are explained about the blood pressure frequency used in this study, namely: TDS <120 and TDD <80 (Normal), TDS (120-139) or TDD (80-89) (Pre-hypertension), TDS (140-159) or TDD (90-99) (Hypertension Level 1). Students' blood pressure frequency data is taken before taking the competency exam. Their blood pressure frequency data before the exam is displayed in table 5.

Table 5 Distribution of student blood pressure frequency before computer-based competency test

Blood pressure	Frequency	Percentage (%)
TDS<120 dan TDD<80 (Normal)	6	27.3
TDS (120-139) atau TDD (80-89) (Pra-Hipertensi)	14	63.6
TDS (140-159) atau TDD (90-99) (Hypertension Level 1)	2	9.1
Total	22	100.0

Based on table 5 shows the blood pressure of students before the computer-based competency exam. There were 6 students (27.3%) who had normal blood pressure, 14 students (63.6%) had prehypertensive blood pressure, and 2 students (9.1%) had the condition of hypertension level 1.

The second stage of blood pressure data was taken after the student took the competency exam. The results of the anxiety data are shown in table 6.

Table 6 Distribution of student blood pressure frequency after computer-based competency test

Blood pressure	Frequency	Percentage (%)
TDS<120 dan TDD<80 (Normal)	11	50.0
TDS (120-139) atau TDD (80-89) (Pra-Hipertensi)	11	50.0
Total	22	100.0

The table above indicates that the blood pressure of students after a computer-based competency test, 11 students (50.0%) had normal blood pressure, and 11 students (50.0%) had prehypertensive blood pressure.

After the measurement of blood pressure before and after the exam is done, the data is processed to find out the average blood pressure of students before and after taking the competency exam. The average student's blood pressure can be seen in table 7.

Table 7 Distribution of Average Blood Pressure of Respondents Before and After Taking Computer-Based Test

Variable	Mean	SE	SD	n	P-Value
Pre-test blood pressure	2.6818	.16627	.77989	22	.231
Blood Pressure Post Exam	2.3636	.18073	.84771		

The study results found that the average blood pressure of respondents before the computer-based competency test was 2.6818, with a standard deviation of 0.77989. After taking the exam, the average blood pressure was 2.3636, with a standard deviation of 0.84771. The mean difference between blood pressure before and after the test was 0.31818, with a standard deviation of 1.21052. The statistical test results obtained a value of $p = 0.231$ then it can be concluded that there is no significant difference in average between blood pressure before and after following a computer-based exam.

Analysis of the paired T-Test (dependent T-Test) to examine changes in students' blood pressure

The T-test dependent analysis test is used to find out the changes in students' blood pressure before and after taking the competency exam. The results of changes in students' blood pressure can be seen in table 8

Table 8 Blood Pressure Comparison Before and After Computer-Based Competency Test

Variabel	Mean	SD	SE	CI 95%	P Value
BP PreTest	.31818	1.21052	.25808	-.218	.231
BP Post tes				.854	

Based on the table above, the mean score of the difference between blood pressure before and after the test is 0.31818 with a standard deviation of 1.21052. The statistical test results obtained a value of $p = 0.231$, and then it can be concluded that there is no significant difference in average between blood pressure before and after following a computer-based exam.

The final analysis test in this study was to look at the correlation between anxiety and students' blood pressure. The test used is the chi-square test. Test results are shown in Table 9.

Table 9 Chi-square test anxiety analysis with blood pressure changes

	df	P
Pearson Chi-Square	6	.216

From the table above, the correlation between the students' anxiety and their blood pressure shows a value of $p = 0.216$. The value $p > \alpha$ value. Thus, it can be concluded that there is no significant association between anxiety taking competency exams and changes in students' blood pressure.

Discussion

The discussion of these results includes the influence of anxiety in administering computer-based competency tests on changes in the blood pressure of Ners students in 2021 as follows:

Student anxiety levels before and after taking computer-based competency exams

The study revealed different levels of anxiety in students before administering the test. Of 22 students, 17 (77.3%) had no anxiety, two (9.1%) had mild anxiety, two (9.1%) had moderate anxiety, and one person (4.5%) had severe anxiety. The average test of student anxiety before the exam obtained a mean of 10.6818 with a standard deviation of 9.45358.

These findings are in line with research conducted by Rizza (Anissa et al., 2018), which found that 26.4% of students did not experience anxiety, 27.6% of students experienced mild anxiety, 32.2% of students experienced moderate anxiety, 13.0% of students experienced severe anxiety, and 0.8% of students experienced very severe anxiety. There is little difference with the research results found by Apriani (Apriani, 2014), which found that medical students who take the Osaka exam also experience anxiety with varying levels, namely 49.1% experience moderate anxiety, 22.6% of students experience mild anxiety, 13.2% of students experience severe anxiety, 9.4% of students experience very severe anxiety and 5.7% of students do not experience anxiety disorders.

Based on previous research conducted on nursing students, the study results were almost the same as the findings of this study. The percentage of students who do not experience anxiety is more significant when compared to the percentage of students who experience mild, moderate, and severe anxiety when facing exams. There is a difference in the research conducted on medical students. On the

Osaka exam, which medical students attend, they tend to experience moderate and mild anxiety levels. From this condition, it can be concluded that students who will take the exam experience different anxiety levels according to their respective individuals.

Anxiety in individuals can arise in situations that are usually considered meaningful conditions in their life. At the time, most people were faced with something that made them anxious. Anxiety disorders will appear if the anxiety continues for a long time, and usually, there will be behavioral changes or changes in the body's metabolism, such as cold body sweats, groggy, and so on.

Anxiety is an emotional state without a particular object. Anxiety is triggered by the things that accompany all new experiences, including taking an exam. Anxiety that arises and is experienced by students who will take the exam is supported by anxiety theory that focuses on interpersonal concepts, which are concepts that assume that anxiety occurs due to fear of interpersonal rejection. Students are afraid of being eliminated or feeling marginalized by the environment if they do not pass the exam. Students feel embarrassed not to graduate, which can also trigger the emergence of anxiety (Stuart, 2016)

After students take the competency exam, an assessment of the second stage of anxiety level is carried out. Of the 22 students, 20 (90.9%) had no anxiety, and two (9.1%) experienced mild anxiety. From these results, it is clear that a person will experience a sense of security and comfort if they have gone through a condition that threatens him. This condition follows the theory of anxiety that focuses on the theory of catecholamines (Anissa et al., 2018). In this theory, it is described that there will be an increase in the secretion of adrenaline (epinephrine) in the blood that can cause anxiety. Going to or being on the exam is included in a new condition and causes a person anxiety.

Comparison of students' blood pressure before and after taking the computer-based competency test

The findings revealed that the blood pressure of students before the computer-based competency test, there were 6 students (27.3%) who had normal blood pressure, 14 students (63.6%) were in prehypertensive blood pressure, and 2 students (9.1%) were in stage 1 hypertension. The mean score significantly between blood pressure before and after the test was 0.31818 with a standard deviation of 1.21052. The results of the statistical test obtained a value of $p = 0.231$. It can be concluded that there is no significant difference in average between blood pressure before and after following a computer-based competency test.

This study is in line with research findings found by Februanty and Hartono (Februanty & Hartono, 2015). They found that the average TD systole before the student KDM practice test was 116.75 mmHg (95% CI: 114.06-119.44). Before the student's KDM practice test, the average TD diastole is 76.50 mmHg (95% CI: 74.37-78.63). Based on these two studies, there was an increase in students' blood pressure who will take the exam. Most of the increase in blood pressure was in the prehypertensive category with a blood pressure range of TDS (120-139) or TDD (80-89), followed by level 1 hypertension.

When going to the test, increased blood pressure, both systole, and diastole is indicated as one of the stress triggers. This follows the results of research conducted by Gaya et al. (Gaya et al. 2013). Their research showed that students who were undergoing presentation seminars on the final exam experienced academic stress shown by increased blood pressure and prolactin levels. Academic stress can be one of the causes of stress. This is indicated by an increase in blood pressure and prolactin levels. Increased blood pressure and Prolactin are some of the implications of physio pathologically due to neuroendocrine connections of an individual's response to stress.

Blood pressure measurements after the test showed that 11 people (50.0%) were normal blood pressure, 11 people (50.0%) were in prehypertensive blood pressure, and no category 1 hypertension was found. Blood pressure increases rapidly and decreases rapidly, usually caused by psych emotional disorders such as anxiety. After the student completes his exam, his blood pressure returns to normal as proof that the student is in a stable condition.

Based on the above exposure, there was an increase in blood pressure in students who took competency exams but not significant.

The Effect of Anxiety in Administering Computer-Based Competency Tests on student blood pressure changes

The findings showed that the correlation between anxiety and blood pressure showed a value of $p = 0.216$. The value $p > \alpha$. It can be concluded that there was no significant association between test anxiety and changes in blood pressure. This finding was following the studies done by Zahara (Zahara, 2017) that found no association between anxiety and blood pressure in people with hypertension, with coefficient values $r_{xy} = 0.020$ and $p > 0.050$. The mechanism of the emergence of anxiety in a person when experiencing anxiety is that the body will release chemicals such as adrenaline into the blood that will cause various changes, and one of them is increased blood flow, which will trigger an increase in blood pressure.

The increase in blood pressure experienced by students before taking the competency exam is the body's normal response to the condition. At a specific time, the body will respond adaptively along with the acquisition of a sense of security so that blood pressure will slowly return to normal. This study shows that anxiety did not significantly affect the blood pressure changes of students who took computer-based competency exams.

4. CONCLUSION

The conclusion of the results of this study was no significant association between the anxiety facing computer-based competency tests and changes in students' blood pressure, as evidenced by a score of $p = 0.216$. There was a significant difference in the average score between anxiety before and after taking the computer-based test $p = 0.042$. There was no significant difference on average between blood pressure before and after taking the computer-based competency exam $p = 0.231$. Advice for further researchers to be able to examine specific factors that affect blood pressure changes in students who take computer-based competency exams.

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