



THE EFFECT OF BACK AND HAND MASSAGE INTERVENTION ON PAIN IN PATIENTS POST-CARDIAC CATHETERIZATION

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ABSTRACT

Cardiac catheterization is an invasive procedure that involves the insertion of one or more catheters into the heart and certain blood vessels to visualize the heart chambers, valves, great vessels, and coronary arteries. Prolonged immobilization in patients after cardiac catheterization can cause complications, one of them is back pain. The nursing intervention in this study was back and hand massage. This study aims to determine the effectiveness of back and hand massage interventions on pain in patients after cardiac catheterization. This study used a quasi-experimental method with a pre-test and post-test design, with an intervention group and a control group design. The sampling technique used purposive sampling. The sample size was 36 patients who had cardiac catheterization, calculated using the Federer formula. The intervention group received a total of 20 minutes of massage therapy: 10 minutes of back massage, 10 minutes of hand massage, the first period was carried out after the sheath was removed, and the second period was carried out after the elastic bandage was removed. The data analysis technique used multivariate with the Generalized Linear Model (GLM) Repeated Measures (RM) method. The results showed that back and hand massage had an effect on pain in post-cardiac catheterization patients, with a P value of 0.000. This indicates decreasing a pain scores after the intervention. Multivariate testing indicated that previous experience with catheterization pain influenced pain in post-catheterization patients. Back and hand massage intervention is expected to be an alternative supportive intervention, especially in post-catheterization patients, in reducing pain.

Keywords: back and hand massage; cardiac catheterization; pain; previous catheterization pain experience

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INTRODUCTION

Cardiovascular disease is a major global health problem, including in Indonesia. The prevalence of coronary heart disease in Indonesia every year experiences a significant increase. Coronary heart disease (CHD) is the leading cause of death in both developed and developing countries, with the number of sufferers increasing annually. The number of patients dying from heart disease is increasing due to poor lifestyle habits, increasing obesity rates, smoking, and alcohol consumption (Hassan et al., 2019). Cardiac conduction disorders and arrhythmias can occur due to various causes of electrical signal transmission within the heart or abnormalities in the surrounding cardiac region, which are generally classified as bradycardia, tachycardia, and premature contractions (Roh et al., 2018). According to the World Health Organization (WHO), cardiovascular disease is a global threats that play a role in reason death and disability, the largest in the world. Every year, an estimated 17 million people die consequence disease system cardiovascular disease. In 2017, coronary heart disease in Indonesia, ranked first to contribute number death the largest in Asia. Coronary Heart Disease (CHD) is caused by hypertension, hypercholesterolemia, smoking, obesity, diabetes mellitus, age, and sex gender (Alkhusari et al., 2020).

Mortality rate due to cardiovascular disease increased, 37% of the Indonesian population. Based on research results, the 2018 basic health research explains that the prevalence of heart disease the

more increases significantly with age and shows that 1.5 % of the Indonesian population suffers from heart disease, reported CHD is main reason cause and first from all over death, for 26.4%. The prevalence disease coronary heart in a way overall increased by 2.1%. Jakarta province occupies the ranking after North Kalimantan, Gorontalo, and Yogyakarta. In Indonesia, 3.5% of patients in one hospital are among them is sufferers of cardiovascular disease (Sartika & Pujiastuti, 2020). Heart Catheterization is a procedure, a non-surgical intervention with the use catheter for widening or opening vessels such as the coronary arteries with a balloon or stent. Reduction complications post-heart catheterization can be done with immobilization, like sleeping lying on back in place. Sleep for 6-8 hours (Harmayetty et al., 2018), whereas prolonged immobilization in post-catheterization patients' hearts can cause complications, one of them is a painful back (Arafat & Purwanti, 2020). In addition, post-catheter pain in patients can also caused by the installation heart catheter.

Based on data results obtained from catheterization in the Intensive Coronary Care Unit (ICCU) Siloam Hospitals Kebon Jeruk from March to May 2023, there were 36 patients undergoing action heart catheterization. Based on the interview results with 10 patients, 80% of patients complained of discomfort and pain caused by the insertion of heart catheter. Besides that, the patient also complained of discomfort and pain in the back consequence of prolonged immobilization. Nursing actions required for post-catheterization patients' hearts, including evaluating the complaint patient regarding pain/discomfort, numbness, or tingling in the extremities, and intervention (Harmayetty et al., 2018).

The Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) in 2000, developed painful management standard for health institutions with the statement that complaints must be assessed for all patients because they have the right for reviewed and given management painful in a right way. Union nations declare that painful handler is one of the basic human rights (Bawole et al., 2022). Nurses who care for patients during the post-catheterization period have difficulty managing the pain and discomfort patient. Therefore, some techniques can be used to overcome the problem of pain in nursing, one of them with the use of relaxation techniques like massage.

Massage is one of the types treatment complementary or alternative treatment for increasing health. Patients' post-heart catheterization generally will undergo immobilization for 6-8 hours. During the immobilization period, massage can be done to reduce complications post socialization that possible occurs. There are two types of regular massage, the first is the back the usually known as back massage, and the second massage on the hand or the usual known with hand massage. Massage can influence motor, nervous, and cardiovascular systems, triggering rest and relaxation throughout the body. The purpose of massage is also to return venous and lymph flow, stimulating sensory receptors in the skin and subcutaneous For reduce pain so which can give comfort to patients (Pangesti & Astuti, 2022). There is no research that looks at the comparison of this two type of massage. Therefore, the objectives of the researcher is to determine the effect of "back and hand massage on pain in post-cardiac catheterization patients at Siloam Hospitals Kebon Jeruk Jakarta in 2023".

METHOD

In the research, this study uses quasi-experiments with a Pre-test and Post-test type with a Control Group Design. This study was conducted at Siloam Hospitals Kebon Jeruk Jakarta, with a population of post-catheterization patients. The calculation sample size using Federer's formula is 36 patients that treated with catheterization, with the purposive sampling technique the researcher selected the study sample according to predetermined criteria, in the Intensive Coronary Care Unit (ICCU), Siloam Hospitals Kebon Jeruk. This research starting by data collection from August to December 2023. This study focuses on pain after heart

catheterization. The data analysis technique used is univariate, bivariate, and multivariate analysis, such as the Generalized Linear Model (GLM) Repeated Measures (RM) models.

RESULT

Characteristics of the majority of respondents in the study. These are respondents with Javanese tribal, retired, and had no experience with catheterization previously.

Table 1.
The results of univariate analysis

Characteristics	Category	Intervention Group n (%)	Control Group n (%)	Chi-Square Tests
Education	Low education	6 (33.3)	8 (44.4)	0.494
	Higher education	12 (66.7)	10 (55.6)	
Ethnic group	Non-Javanese	5 (27.8)	4 (22.2)	1.000
	Java	13 (72.2)	14 (77.8)	
Gender	Woman	-	6 (33.3)	0.019
	Man	18 (100)	12 (66.7)	
Occupation	Doesn't work	10 (55.6)	12 (66.7)	0.494
	Work	8 (44.4)	6 (33.3)	
Previous experience of catheterization	There isn't any	15 (83.3)	13 (72.2)	0.691
	There is	3 (16.7)	5 (27.8)	

This table shows that the intervention group has an average age of respondents 59 year old respondents between 35 to 84 years ($SD=14.767$), highly educated (66.7%), Javanese (72.2%), male type of sex (100%), majority no working (55.6%), and have no catheterization experience previously (83.3%). Meanwhile group average age control 62 year old respondents between 39 to 78 years ($SD=10.074$), highly educated (55.6%), Javanese (77.8%), male type of sex (66.7%), majority no working (66.7%), and have no catheterization experience previously (72.2%). Meanwhile, in the homogeneity test to determine variants between the second group, Chi-square tests and Levene's test were performed. The results of the homogeneity test for every characteristic of respondents show results mark-value >0.05 except on characteristics type sex, obtained $p\text{-value} < 0.05$, where the data is not homogeneous. Average pain and normality test in the group intervention and control before and after treatment can be seen in table 2.

Table 2.
Normality test in the group intervention and control before and after treatment

Group	Measurement	Mean	SD	Min	Max	95%CI	P-value
Intervention Group	Before	4.61	1.145	2	6	4.04-5.18	0.142
	After	2.44	1.294	1	5	1.80-3.09	
Control Group	Before	4.78	1.114	3	6	4.22-5.33	0.059
	After	4.39	1.335	2	6	3.73-5.05	

Table 2 show that average score of painful post-catheterization patient heart on both sides group was decline. In the group intervention before treatment 4.61 ± 1.145 , after treatment 2.44 ± 1.294 with difference of 2.17. In the group control, score before treatment 4.78 ± 1.114 and after treatment 4.39 ± 1.335 with difference of 0.39. There is meaningful average difference of post-patient heart catheterization in the group intervention and control between before and after treatment. Based on the normality test results obtained level painful before and after treatment in the intervention groups, and control group had a $P\text{-value} > 0.05$. It can be concluded that the data is normally distributed, so the type of test used is the *Paired T test*. The difference in average score of pain value before and after treatment for every group can be seen using bivariate analysis, as shown in Table 3 below:

Table 3.
The difference in painful average pain value before and after treatment

Variables	Group	Measurement	Mean	SD	SE	Paired Differences		t	P-value
						Mean	SD		
Painful	Intervention	Before	4.61	1.145	0.270	2.17	1.295	7.100	0.000
		After	2.44	1.294	0.305				
	Control	Before	4.78	1.114	0.263	0.39	0.502	3.289	0.004
		After	4.39	1.335	0.315				

Table 3 shows the average score painful group intervention before the given treatment is 4.61 (SD = 1.145), and after the given back and hand massage treatment average score of painful to 2.44 (SD = 1.294). The difference in the average value of painful before and after in the group intervention is (MD = 2.17, $t = 7.100$, $P\text{-value} = 0.000$), so it can be concluded existence meaningful differences in the average pain before and after treatment in the group intervention. While the average score of painful group control before given treatment is 4.78 (SD = 1.114), and after treatment, average score painful to 4.39 (SD = 1.335). The difference in the average value painful before and after in the group control is (MD = 0.39, $t = 3.289$, $P\text{-value} = 0.004$), so it can be concluded existence meaningful differences in the average pain before and after treatment in groups control. So that can be concluded that there is a decline in score. The difference in pain in the group intervention and control can be seen in table 4.

Table 4.
The average difference difference the painful respondents group intervention

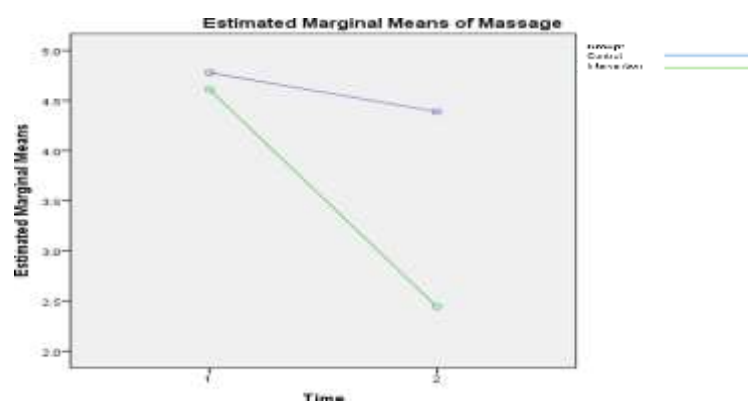
Variables	Group	Mean Differences	SD	SE	t	P-value
Painful	Intervention	2.17	1.295	0.305	6.469	0.000
	Control	0.39	0.502	0.118		

Table 4 shows the average difference difference the painful respondents group intervention *back* and *hand massage* was 2.17 (SD=1.295), while in the group control, of 0.39 (SD=0.502). In the results, the show significant difference between painful respondents in the group intervention and control ($t=6.469$, $P\text{-value}=0.000$). Based on the results multivariate analysis obtained that time influence score subtraction is painful. That's all the long interventions provided, so score painful experience decline results. This can be seen in Table 5 below:

Table 5.
Multivariate Analysis

Source	Sum of Squares (SS)	Degrees Freedom (df)	Mean Square (MS)	F	p-value	Partial Squared	Eta-squared
Time	67.194	2.139	31.413	49.486	0.000	0.593	
Group	42.250	1	42.250	8.828	0.005	0.206	
Time*Group	23.639	2.139	11.051	17.409	0.000	0.339	
Error	46.167	72.727	0.635				

Table 5 indicates significant results in a way F statistic = 49.486, $p\text{-value} < 0.001$, partial eta square = 0.593. Meanwhile, the control group shows results that influence the main group to score subtraction pain, which indicates significant results in a way F statistic = 8.828, $p\text{-value} < 0.05$, partial eta squared = 0.206. The results show significant variability in score subtraction pain in two points measured time points: before massage and after massage. Eta square value large partial (0.593) indicates that part of the big observed variations in subtraction pain can be associated with the influence of time. On the findings, this line under impact back and hand massage intervention, revealed its great influence on subtraction pain during the study duration.



Others findings that previous catheterization experienced have a significant influence on pain. This can be seen in Table 6 below:

Table 6 .
Multiple Linear Regression Test Results

Model	Variables	B	SE	β	t	Sig.	R ²	Adj. R ²	F
1	Age	0.010	0.013	0.112	0.781	0.440	0.366	0.306	6.146
	Ethnic group	0.299	0.361	0.118	0.829	0.414			
	Previous experience of								
	catheterization pain	-1.568	0.375	-0.592	-4.179	0.000			

Table 6 shows multiple linear regression test results between confounding factors (age, ethnicity, and pain previous experience). Based on the test results explain 36.6% of the variance in the model influence painful respondents ($R^2=0.366$) and $\beta = -0.592$, P-value= 0.000 is predictor of in change painful respondents.

DISCUSSION

The results of the research conducted showed characteristics of respondents consisting of including age, statistical test results obtained that the average age of respondents in the group intervention was 59 years, and 62 years in the group control. This findings was strengthened from a number of literature, such as Riskesdas 2018, stated that 13% of sufferers of heart disease are aged ≥ 50 years, age is one of important factors in heart disease. The theory states that the more age of somebody so, the more risk of developing heart disease, a consequence of the progressive accumulation of atherosclerosis in the coronary arteries with aging. In the system cardiovascular aging process causes decrease in heartbeats, narrowing the lumen of the coronary will hinders the flow of blood to the heart muscle, so that damage to disturbance heart muscle's function (Melyani et al., 2023)

Research results are also consistent with the theory of CHD supporters, U. (2021), that at the age of elderly around >50 years, is amount the most patients experience heart disease. The more old someone the more big risk caught heart disease due to weakened vascular or blood vessels, which further weakens that making things easier for plaque that develop. There are increasingly serious consequences. This is at a time that proves Tierney's statement (2018) that the prevalence of heart disease keeps increasing along with increasing age.

Research result based on the level of education, the majority of respondents are educated, which is in line with a study by Sartika & Pujiastuti (2020). Education level relate to knowledge that plays a role in determining the quality of human, especially in absorbing information provided (Notoatmodjo, 2012). Information obtained about health pushes individuals to more sensitive to their body condition, so that respondents are more provide information about diverse and conscious treatment decide medical action to improve his health.

The results of the research conducted with the characteristics ethnic group obtained results where the most numerous tribe is Javanese ethnic group. From the data obtained, it is accordance with the

study location, where carried out in the Jakarta area, and some big patients who come to the study location was located in the Jakarta and surrounding. Although there is a number of patients outside Java with non-Javanese ethnic groups. Culture influences belief in patient will affect the condition that happened to him, even though in the end, nothing can be concluded about the intact to the ethnic group. The results of research conducted by Puspita, (2023) stated that everyone with different cultures will overcome pain in different ways. People who experience the same intensity of pain possible not respond to painful in the same way. There a differences in associated meanings and attitudes with pain in various culture.

The next characteristic is gender, the results found in the study specifically, in the group intervention, all of its respondents various sexes. In the group control, the majority of respondents various sexes. This is in line with research conducted by Niluh (2016), which was conducted at Prof. Dr. RD. Kandou Manado General Hospital, showing that the frequency of men bigger compared with Woman, 77.5%. The difference in type, gender, style of life, and habits, in that case, post-catheterization patient heart part big various sex men twice as many compared to various woman, this is due to the difference in style of life that is not healthy. This matter is in line with a research results from Usri & Nurmadilla (2022) about the connection between a stressful lifestyle with heart disease in line with a study, which states that man has more heart disease compared to with Woman.

The job characteristics of the respondents in this study were that most of them were no longer working, due to a part of the respondents already entering retirement. Supported by the results of research by Marbun & Tambunan (2023), which showed that part big characteristics of patients who experience heart action catheterization are patients who are of a certain age. The same thing was also stated by Sanuade in 2019, where most of patient of heart catheterization is patients who have a pension as well as a life with a history of diabetes and hypertension (Sanuade et al., 2019).

The results of the research conducted on the characteristics of painful catheterization experience previously, it was found that the majority of respondents have no experience of painful catheterization previously. Experience can form adequate coping or precisely cause maladaptive coping. In addition, this is possible Because patients who have undergo catheterization already adapt to stressor experiences previously, and has understood about procedure.

This research results in line with Emily's research (2023) states that that experiencing pain can form a coping strategy in a person. This is supported by the theory of Potter et al., (2023), which states that every individual Study from experience pain. According to researchers, if an individual experience the same repetitive and painful sensations that are removed, the result is that the patient is more ready to do capable actions to reduce pain. If a patient No Once feels pain once, then the first perception of pain can be disturbing when coping with pain. Based on research results and references from supporters about experience with catheterization previously can be concluded that experienced catheterization is a very supportive level of readiness patient to undergo heart catheterization.

Average pain before and after in the group intervention and control. From the results research that has been conducted by researchers obtained different average values before the given treatment, good in groups intervention as well as in the control groups, in the group intervention, decrease in the mean value, with a difference of 2.17. A similar thing followed in groups control, which is decline in mean value with a difference of 0.39, although the decline in the group control is not significant like the intervention group. This was also stated by Hassan et al. (2019) who showed that scores painful after massage intervention in a groups study decrease in a way significant and also significantly different in a way significant compared to with control group. While Tiara et al.'s research (2019) said the results study show the average intensity painful before back massage

therapy is 4.21, and after back massage therapy was 3.19 in post-laparotomy patients.

Based on the back and hand massage intervention during two meetings that have been conducted on each respondent group intervention, then statistical tests were conducted to see the effect of back and hand massage on pain in post-catheterization patients' hearts using the Paired T test, the results were obtained $p\text{-value} = 0.000$ at $\alpha < 0.05$. Based on statistical test results it can be concluded that there is the effect of back and hand massage on pain in post-catheterization patients. On average, it occurs decline score painful after the intervention. This is in accordance with results researcher Rejeh, et. al. (2020) said there is significant influence on the group interventions provided treatment massage reflection hand capable reduce pain in patients after action angiography Coronary. Another thing was also expressed by Yuniar (2023) about back massage being able to influence decline painful matter This caused by nerves cells in the skin that are pressed send signal through one of the center pain, namely marrow bone back, inside his journey more fast than pain so thus reducing pain. Then, in Masliha et al (2021) said there is a significant influence of classical massage on the intensity of pain in women with cancer undergoing chemotherapy at the district hospital in Indramayu.

Researchers assume that this back and hand massage therapy is capable of reducing pain because massage is effective in giving relaxation, physical and mental, reducing muscle tension, increasing blood circulation, as well as stimulating and enhancing the nervous system, nerves so which is effective in reducing pain. This is in line with research conducted by Soamangon, et al., (2024) who conducted research on the Relaxation Vest device, which is a therapeutic vest that produces the sensation of massage therapy and warm therapy to relieve back pain experienced by post catheterization patients. In addition, Kanakalakshmi (2022) found that, patients who receive therapy massage experience pain relief in a way significant.

Research results show that the intensity of pain in patients post-catheterization is higher in patients who have not experience painful catheterization previously more tall than in respondents who have experienced painful catheterization previously. Research results. This is in accordance with research conducted by Potter et al., (2023), found that 71% of respondents who had previous pain experience experienced mild pain or the same as previous surgical experiences. Meanwhile, the remaining 29% reported feeling more pain than during previous surgery.

This matter in line with theory that states respondents who have ever experience painful previously has lower pain intensity compared to those who do not experience painful previously, because previous pain succeed lowered, then will more easy for individual for do necessary actions for reduce pain (Potter et al., 2023). This supported by the statement of Oliveira, (2020) one of factor affecting painful is previous experience, every individual study from pain experience. Previous pain experience not always means that individual will accept painful with more easy in the future. Statistical test results multivariate show there is influence from confounding variables, which previous pain experience variable received significant results for painful respondents.

CONCLUSION

There is a significant meaningful difference average pain levels of respondents in the intervention groups and control groups, with a $p\text{-value} = 0.000$. Based on results research conducted using multiple linear regression tests, there are confounding variables of pain previous experience.

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