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Implementation of Foot Massage Therapy on Hemodynamic Status Stability in *Acute Myocardial Infarction* (AMI) Patients in Intensive Cardiovascular Care Unit (ICVCU) of Dr. Moewardi Hospital Surakarta

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ABSTRACT

Background: Acute Myocardial Infarction (AMI) is the main cause of death globally, including in Indonesia. Hemodynamic monitoring by nurses is essential in the management of AMI. Apart from pharmacological therapy, post-AMI rehabilitation is important to prevent complications, by paying attention to psychological aspects with foot massage therapy the patient can relax so that the hemodynamic status is stable. **Purpose:** To determine the effectiveness of the effect of implementing foot massage therapy on changes in hemodynamic status in Acute Myocardial Infarction (AMI) patients in Dr. Moewardi Surakarta Hospital. **Method:** This research used a quantitative quasi-experimental design with a pre-test post-test with control design method. The instrument used included the Standard Operating Procedure (SOP) for foot massage therapy, a checklist sheet for providing foot massage therapy, a sphygmomanometer, oximetry and a hemodynamic status observation sheet. The research sample was 58 respondents divided into 2 groups randomly. **Results:** The results of the Paired Sample T-Test analysis showed that 28 respondents were given foot massage therapy and the hospital therapy program had an effect on the stability of the hemodynamic status of AMI patients, with a p-value of SBP 0.003, DBP 0.001, MAP 0.042, HR 0.001, and RR 0.002. **Conclusion:** This research shows that foot massage therapy for 15-20 minutes a day for 3 days can stabilize the hemodynamic status of AMI patients.
Keyword : *hemodynamic status, foot massage therapy, acute myocardial infarction*

Introduction

The heart is a vital organ in the human body responsible for the circulatory system. The heart performs two main tasks: pumping oxygen-rich blood throughout the body via the arteries and receiving carbon dioxide-rich blood from the entire body via the veins. The heart works tirelessly to ensure proper blood distribution throughout the body, which is essential for sustaining life(Andika B, Ishak I, Boy AF, Azmi Z, Yetri M, 2023)

Despite its vital function, the heart is not immune to various diseases, one of which is Acute Myocardial Infarction (AMI). In addition to stable angina pectoris, unstable angina pectoris, heart failure, and sudden death, AMI is one of the five main symptoms of coronary heart disease. The three main categories of AMI are ST Segment Elevation Myocardial Infarction (STEMI), Non-ST Segment Elevation Myocardial Infarction (NSTEMI), and Unstable Angina Pectoris (UAP)(I Ketut S, Putu Kiki W, 2022). Severe narrowing of the coronary arteries, temporary coronary artery blockage, or microemboli from thrombus and atheromatous material are the main causes of AMI(Nugraha YO, 2021)

According to WHO data in 2021, heart disease is the leading cause of death worldwide, with 17.8 million deaths annually, accounting for about one-third of all global deaths(RI, 2021). In Southeast Asia, heart disease ranks third with a prevalence of 25% of the total population(Melyani M, Tambunan LN, 2023). In Indonesia, in 2018, there were 1,017,290 people with heart disease, with a prevalence of 1.5%, and the province of Central

Java had a prevalence of 1.6%(RI., 2022). Data from the Surakarta City Health Office in 2022 showed that cardiovascular diseases, including hypertension and heart disease, still dominate with a prevalence of 82.25% (Surakarta., 2021)

The role of nurses is crucial in the strict monitoring and emergency management of AMI patients. Strict hemodynamic monitoring within the first 24 hours of the onset of symptoms is vital to reducing the risk of death. This monitoring helps in the early detection and identification of physiological abnormalities and evaluates the treatment administered (Widiyaningsih W, 2019). Although hemodynamic monitoring is not a cure, it can be the basis for appropriate AMI treatment.

In addition to pharmacological therapy, such as the administration of antiplatelet drugs, vasodilators, and reperfusion therapy, complementary therapies like foot massage therapy can also provide significant benefits in the recovery of AMI patients. This therapy has been shown to improve blood circulation, provide relaxation, and enhance the patient's hemodynamic status. Studies indicate that foot massage therapy can positively affect blood pressure, pulse rate, and respiration, making it suitable for patients with vascular diseases (Daud I, 2020)

Symptoms often experienced by AMI patients, such as chest pain and shortness of breath, can cause anxiety that impacts hemodynamic stability. Although pharmacological treatments have been widely applied, the focus on psychological aspects such as anxiety remains insufficient (Kurniawan A, Kristianawati B, n.d.) Consequently, this study aims to determine how the use of foot massage therapy impacts the hemodynamic status parameters of AMI patients. Thus, this research is expected to help develop a holistic approach to AMI patient management through non-pharmacological interventions focusing on hemodynamic balance.

Methods

The research method employed is a quasi-experiment to determine the effects of a treatment by involving a control group and randomly selected samples in a pre-test and post-test design with a control group. The population and sample in this study are Acute Myocardial Infarction (AMI) patients in the Inpatient Ward of Dr. Moewardi Hospital Surakarta. The sampling technique used is total sampling with inclusion and exclusion criteria, involving 58 respondents The Ethics Committee of Dr. Moewardi General Hospital declared that this study is ethically feasible on January 31, 2024, with the number 211/I/HREC/2024.

The sample of this study was 58 respondents divided into 2 groups randomly. The therapy given to the intervention group was foot massage therapy and oxygenation therapy and medication given by the doctor. While the therapy given to the control group was oxygenation therapy and medication according to the Doctor's program. The research instruments used included the Standard Operating Procedure (SOP) for foot massage therapy, a checklist sheet for providing foot massage therapy, a sphygmomanometer, oximetry and a hemodynamic status observation sheet, consisting of systolic blood pressure, diastolic blood pressure, mean atrial pressure, heart rate/pulse, and respiration rate. The statistical test used was the Paired T Test for paired tests and the Independent T Test for unpaired tests. The results of the Paired T Test analysis to see the effectiveness of the treatment were carried out by the N-Gain Score test.

The implementation of foot massage therapy is one of the complementary therapies with a form of touch therapy that involves tissue manipulation to increase relaxation and improve circulation. The implementation of foot massage therapy was carried out on respondents with a dose of 15-20 minutes which was carried out for 3 consecutive days in patients with Acute Myocardial Infarction

Results and Discussion

1. Respondent's Characteristic

This study was conducted on patients with Acute Myocardial Infarction (AMI) in the Inpatient Room of Dr. Moewardi General Hospital, Surakarta. The study was carried out from February to March 2024 with a total of 58 respondents. The research results are as follows:

Table 1. Frequency Distribution

Characteristics	n	(%)
Gender		
Male	46	82,1
Female	10	17,9
Age		
45-59 years (Pre-Elderly)	29	51,8
60-69 years (Young Elderly)	19	33,9
70-89 years (Middle Elderly)	8	14,3
Medical Diagnosis		
STEMI	48	85,7
NSTEMI	8	14,3

Based on Table 1, the gender distribution is dominated by male respondents at 82.1%, age distribution is dominated by respondents in the pre-elderly phase (46-59 years) at 51.8%, and the medical diagnosis is dominated by STEMI at 85.7%.

2. The Analysis Results of Hemodynamics Status of AMI Patiens with Dependent T-Test

Table 2. Paired Sample T-Test Analysis Results of Systolic Blood Pressure, Diastolic Blood Pressure, Mean Artery Pressure, Respiratory Rate, and Heart Rate of AMI Patients in the Intervention Group and Control Group

		n	*Mean*	*Std. Deviation*	*Sig. (2-tailed)*
SBP	Intervensi	28	28,143	45,203	0,003
	Kontrol	28	-7,929	25,800	0,116
DBP	Intervensi	28	-14,214	13,198	0,001
	Kontrol	28	-6,464	16,453	0,047
MAP	Intervensi	28	18,667	46,317	0,042
	Kontrol	28	0,500	27,193	0,923
HR	Intervensi	28	26,607	29,825	0,001
	Kontrol	28	8,321	25,529	0,096
RR	Intervensi	28	3,786	5,776	0,002
	Kontrol	28	0,536	4,796	0,559

Based on the results of the Paired Sample T-Test analysis, it is known that systolic blood pressure, diastolic blood pressure, mean artery pressure, heart rate, and respiratory rate in the foot massage therapy intervention group have a significance level of <0.05. So it can be concluded that there is a significant effect of foot massage therapy intervention on the hemodynamic status of AMI patients.

3. The Analysis Results of Hemodynamics Status of AMI Patiens with *Independent T-Test*

Table 3. Independent T-Test Analysis Results of Systolic Blood Pressure, Diastolic Blood Pressure, Mean Artery Pressure, Respiratory Rate, and Heart Rate of AMI Patients in the Intervention Group and Control Group

		Mean	*Std. Deviation*	*Sig. (2-tailed)*
SBP	Intervensi	108,00	17,472	0,001
	Kontrol	143,32	17,835	
DBP	Intervensi	83,29	11,540	0,004
	Kontrol	95,29	17,314	
MAP	Intervensi	163,52	18,991	0,000
	Kontrol	194,11	20,235	
HR	Intervensi	73,93	8,977	0,042
	Kontrol	80,29	13,405	
RR	Intervensi	18,04	2,151	0,001
	Kontrol	19,82	2,749	

The table above presents the results of the Independent T-Test analysis consisting of 56 respondents with a significance value (2-tailed) of SBP in the intervention and control groups of 0.000, a significance value (2-tailed) of DBP in the intervention and control groups of 0.004, a significance value (2-tailed) of MAP in the intervention and control groups of 0.00, a significance value (2-tailed) of HR in the intervention and control groups of 0.042, a significance value (2-tailed) of RR in the intervention and control groups of 0.00, it can be concluded that there are differences in the intervention and control groups.

4. The Effectiveness Test of Foot Massage Therapy Intervention Using N-Gain Score between Intervention Group and Control Group

Table 4. The Effectiveness Test of Foot Massage Therapy Intervention to Hemodynamic Status

Variabel	Intervensi		Kontrol	
	N-Gain Score	N-Gain Persen	N-Gain Score	N-Gain Persen
SBP	2,0100	201,00	0,1087	10,87
DBP	1,0931	109,31	0,7711	77,11
MAP	1,5311	153,11	-,0081	-,81
HR	1,1892	118,92	1,8937	189,37
RR	0,8356	83,56	0,6597	65,97

Based on the results of the N-Gain Score test calculation consisting of 28 respondents, the average SBP intervention group was 2.0100 or 201% which means the high value category and the effective interpretation category, the DBP intervention group average was 1.0931 or 109.31% which means the high value category and the effective interpretation category, the MAP intervention group average was 1.5311 or 153.11% which means the high value category and the effective interpretation category, the HR intervention group average was 1.1892 or 118.92% which means the high value category and the effective interpretation category and the RR intervention group average was 0.8356 or 83.56% which means the high value category and the effective interpretation category. While in the control group the results of the N-Gain Score test calculation consisted of 28 respondents, the average SBP control group was 0.1087 or 10.87% which means the low value category and the ineffective interpretation category, the average DBP control group was 0.7711 or 77.11% which means the high value category and the effective interpretation category, the average MAP control group was -.0081 or -81% which means the low value category and the ineffective interpretation category, the average HR control group was 1.8937 or 189.37% which means the high value category and the effective interpretation category and the average RR control group was 0.6597 or 65.97% which means the moderate value category and the fairly effective interpretation category. Based on the results of these data, it can be concluded that foot massage therapy is effective against changes in hemodynamic status in patients with acute myocardial infarction.

5. The Effect of Implementing Foot Massage Therapy on AMI Patients

Implementation of foot massage therapy can provide health benefits, starting from making the body more relaxed, relieving stress to maintaining body flexibility so that muscles do not stiffen easily. Based on the Paired Sample T-Test, the results showed that there was an effect of foot massage therapy on the hemodynamic status of Acute Myocardial Infarction (AMI) patients, namely systolic and diastolic blood pressure, Mean Artery Pressure (MAP), Heart Rate (HR), and Respiration Rate (RR). This means that there were significant changes in blood pressure, mean arterial pressure, heart rate, and respiratory rate after foot massage therapy which was carried out on respondents with a dose of 15-20 minutes for 3 consecutive days in patients with Acute Myocardial Infarction. Foot massage therapy affects the hemodynamic conditions of AMI patients through stimulation of reflexology points on the soles of the feet that are connected to various parts of the body, including vital organs such as the heart and lungs, and by increasing blood circulation, blood pressure, mean arterial pressure, heart rate, and respiratory rate can experience significant changes. Another factor that may influence is the psychological effect of foot massage therapy. A pleasant and relaxing massage can reduce stress and anxiety, which in turn can affect cardiovascular function. Foot massage therapy is done by stimulating reflexology points on the feet that are associated with certain organs and systems. Through massage and pressure applied to these points, nerve signals are sent to the brain and autonomic nervous system, which then produce physical responses such as decreased blood pressure, decreased heart rate, and muscle relaxation. Research by(Daud & Sari, 2020) is also in line with this where the study showed that systolic and diastolic blood pressure, MAP, HR, and RR decreased significantly. Extrinsic and intrinsic regulation of peripheral blood flow causes smooth muscle relaxation and arterial vasodilation through vasomotor activity during foot massage therapy, which contributes to decreased MAP. In addition, stimulation of parasympathetic nerve Fibers releases acetylcholine and decreases frequency depolarization, thereby reducing heart rate (HR). Decreased HR allows for longer ventricular filling time, thereby increasing cardiac stroke volume, increasing cardiac output, and improving blood circulation throughout the body, including the lungs. Good blood circulation in the lungs maintains the balance of oxygen and carbon dioxide in the tissues. This increases oxygen saturation (SpO2) which stimulates the respiratory central, thereby reducing the respiratory rate to normal levels. The

results differ from the findings in the study by(Momeni M, Arab M, Dehghan M, 2020) stating that there was no effect of foot massage on hemodynamic parameters in Swedish Hospitals. In this study, the group was divided into three groups, namely the foot massage group given by nurses, given by family and not given foot massage. The results showed that the average arterial pressure decreased in the third group 1 week after the intervention, which was not statistically significant. The average heart rate also decreased in the third group 1 week after the intervention, which was statistically significant except for massage by family. The average arterial oxygen saturation decreased significantly in the third group 1 week after the intervention but remained normal. The three hemodynamic parameters did not differ significantly between the three groups.

This difference in results may be due to several factors, such as differences in massage methods and duration, the skills of the person giving the massage, and different patient characteristics. In addition, the psychological effects of massage given by professional nurses compared to family may also affect the results of the study. The study by (Momeni M, Arab M, Dehghan M, 2020) showed a positive effect that may be due to more standardized massage techniques provided by professionals, while the study by (Momeni M, Arab M, Dehghan M, 2020) reflects greater variability in massage practices and perhaps also in patient responses to massage from family members. Overall, although some studies have shown a positive effect of foot massage therapy on the hemodynamic status of AMI patients, these results are not consistent across studies. Therefore, further studies are needed with more rigorous methodology and better control of variables that may influence the results to clarify the true benefits of foot massage therapy in patients with AMI.

Conclusion

Based on the results of the study conducted on 28 respondents regarding the effect of foot massage therapy on the stability of hemodynamic status in AMI (Acute Myocardial Infarction) patients in the inpatient room of Dr. Moewardi Surakarta Hospital, it can be concluded that: Based on the results of the study, the characteristics of the majority of respondents, 46 people (82.1%) were male, 29 people (51.8%) were pre-elderly (45-69 years), and 48 people (85.7%) were diagnosed with STEMI. There is an effect of providing foot massage therapy intervention for 15-20 minutes carried out once a day for 3 days on the stability of hemodynamic status in AMI patients with a p-value of SBP 0.003, DBP 0.001, MAP 0.042, HR 0.001, and RR 0.002. Based on the 5 hemodynamic parameters, the foot massage therapy intervention group has an N-Gain Score of more than (>) 0.07 and an N-Gain Percentage of more than (>) 76%, which means it is included in the effective category with a high value. So, Foot massage therapy intervention can stabilize the hemodynamic status of Acute Myocardial Infarction patients.

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