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EFFECT OF ACUPRESSURE ON QUALITY OF SLEEP AND PULSE RATE IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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ABSTRACT

Background: Patients with acute myocardial infarction have a change in sleep pattern. Acupressure is identified as a therapy with the principle of healing to deal with sleep changes.
Objective: To analyze the effect of acupressure on sleep quality and pulse rate in patients with acute myocardial infarction.
Methods: This study employed a quasi-experiment study with non-randomized pretest-posttest with control group design. There were 50 respondents selected in this study, with 25 assigned in the intervention and control group using consecutive sampling. Quality Sleep Questionnaire and bedside monitor were used to measure sleep quality and pulse rate. Acupressure in combination of Neiguan point (PC 6), Shenmen (HT7), Sanyinjiao (SP6), Yintang (EX3) and Tay (EX5) was given as the nursing intervention in this study. Data were analyzed using paired t-test and independent t-test.
Results: There was statistically a significant increase of quality of sleep and significant decrease of pulse rate in the intervention group with p-value 0.000 (<0.05).
Conclusion: Acupressure has a significant effect on the increase of sleep quality and the decrease of pulse rate in patients with acute myocardial infarction. Thus, it is suggested that acupressure could be one of the nursing interventions for AMI patients to increase sleep quality and decrease of pulse rate.

Keywords: acupressure, acute myocardial infarction, sleep quality, pulse rate

INTRODUCTION

Changes in lifestyle are major factors thought to influence susceptibility to many diseases. Degenerative diseases are often linked with the way people live their life such as heart disease, stroke, and obesity.[1] World Health Organization (WHO) data in 2012 showed that heart disease was the leading cause of death in the world, causing 17.5 million deaths and is expected to continue to increase to 22.2 million by 2030.[2] Acute myocardial infarction (AMI) disease is a type of

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coronary heart disease that has high morbidity and mortality rates. Data on the top ten causes of death in the world showed that ischemic heart disease is the highest, which was 7.4 million deaths in 2012. The Center for Data and Information Ministry of Health explained that the prevalence of coronary heart disease in 2013 based on medical diagnosis and symptoms was 1.5% or 2,650,340 people, while the number of patients with coronary heart disease in East Java was 1.3% or 375,125 people.[2]

The medical record data of ICCU in the Hospital of Dr. Iskak Tulungangung indicated that from January to August 2016 AMI case was ranked first, with the number of inpatients in ICCU room as much as 43% with an average of 27 patients per month.[3] Based on the preliminary study with 8 patients diagnosed with myocardial infarction stated that they have low quality of sleep. Literature stated that critical patients admitted to intensive care have a tendency to have sleep problems and circadian patterns are impaired due to both psychological and environmental factors.[4] Patients with acute coronary have a change in sleep patterns, with difficulty starting and maintaining sleep, increasing reactive responses to stimuli, and decreased total sleep time, early stage of deep sleep (Slow Wave Sleep) and REM sleep. Sleep disorders in ICCU patients can be caused by interaction of patient care, disease severity, noise, mechanical ventilation, pain, medication, or changes in circadian rhythm.

The results of study of Schiza et al[5] indicated that revealed that approximately 56% of patients with sleep deprivation and acute myocardial infarction on the first day of hospitalization had low sleep quality in the first three days of hospitalization. Lei et al[6] revealed that during hospitalization the number of patients who had poor sleep quality was 45.6%, and after undergoing treatment patients who had sleep quality was decreased by 57.4%.

Sleep has an important role in cardiovascular function, and sleep deprivation can lead to intensive anxiety, irritability, and anger that increase heart rate and myocardial oxygen need, which may result in recurrence.[7] Hemodynamic manifestations in AMI patients may be tachycardia or bradycardia.[8] Heart rate experienced tachycardia caused by acute pain and anxiety that increase the stimulation of the sympathetic nerve and adrenal hormones so that the pulse increases.[9]

Decreased sleep quality needs to be given serious attention in dealing with AMI patients. Pharmacologic and non-pharmacological methods can be used to control sleep disorders. The pharmacological therapy used today is the benzodiazepine drug class, however the use of drugs has side effects such as hemodynamic decline, memory deficits, drug resistance and dependence when used over a long period, whereas nonpharmacologic therapy is safer.[7] Many non-pharmacologically independent nursing interventions can be given to overcome sleep disorders as well as the negative impact felt by AMI patients such as dhikr,[10] murotal,[11] and acupressure.[7,12]

Acupressure is a simple, cheap, easy to do, safe, and no side effects because it is not an invasive action.[13] Acupressure is very practical because it does not require any equipment and enough with the hands or fingers.[14,15] Manual stimulation at the acupressure point is proven increasing serotonin and endorphin production and contributing to increased serum cortisol regulation. Endorphin is a natural opiate produced in the body, which triggers a

calming and stimulating response in the body, has a positive effect on emotions, reduces anxiety, causes relaxation, improves sleep quality and normalizes body function,[14] whereas serotonin has the function of regulating mood and sleep.[16]

Empirical evidence of the effect of acupressure has been performed in several studies. Masoumeh et al[7] study revealed that that acupressure can have a therapeutic effect in improving sleep quality in ACS patients and has no side effects with p <0.001 and effect size 1.14. The intervention given in this study was the acupressure at the point of Fengchi (GB 20), shenmen (HT7), yongquan (KL1), ying-tang (EX-3) with a duration of 18 minutes performed 1 times daily for 3 days.[7]

Another study conducted by Shariati et al[15] indicated that acupressure in combining shenmen point (HT7), Hegu Li4) and Sanyinjiao (SP6) in 15 minutes for 3 times a week for 1 month showed that there was a difference in sleep quality between acupressure group and control group in hemodyalisis patients with p <0.001 and effect size 1.15.

Based on the results of literature review on acupressure therapy, it is obtained that acupressure at 5 points with combining the heart point of shen men (HT-7), the point of the neiguan heart lining (PC-6), and the spleen point of san yin jiao (SP -6) has an effect on improving the quality of sleep for those who have difficulty getting into sleep and other sleep disturbances; and the special point of tay point (EX-5) and yintang (EX-3) gives a relaxed feeling.[17] Selection of such intervention points is practical, easier to do, and the location of the selected point is easy to find and be applied by the nurse. However, little is known about the acupressure in combination of Neiguan point (PC 6), Shenmen (HT7), Sanyinjiao (SP6), Yintang (EX3) and Tay (EX5) as the nursing intervention in patients with decreased sleep quality and pulse elevation in AMI patients in ICCU. Therefore, this study aims to determine the effect of acupressure on quality of sleep and pulse rate in patients with acute myocardial infarction.

METHODS

Design

This study employed a quasi-experimental study with non-randomized pretest-posttest with control group design, conducted in the ICCU of Dr. Iskak Tulungagung hospital, East Java, Indonesia on January - February 2017.

Population and sample

The target population in this study is all patients with acute myocardial infarction (AMI) treated in the ICCU at Dr. Iskak Tulungagung hospital. Consecutive sampling was used to select the sample. There were 50 respondents selected in this study, with 25 assigned in the intervention and control group. The inclusion criteria in this study were: 1) AMI patient aged ≥ 26 years, 2) able to communicate verbally, 3) had been treated at least 1 x 24 hours, and 4) did not take a sedative drug 4-5 hour before the intervention. The exclusion criteria were: 1) Patient in emergency/critical condition (shortness, hypotension, shock, acute phase), 2) unconscious, 3) patients with contraindications of acupressure: injured skin, swelling and bone / fractures / fractures.

Intervention

Research was conducted by the researcher and an enumerator who have the competence to perform acupressure and certified by the Association of

Chiropractors and Akupresur Seluruh Indonesia (ACASI). Acupressure was performed at the point of Neiguan (PC 6), Shenmen (HT7), Sanyinjiao (SP6), Yintang (EX3) and tay (EX5) in the right and left body, so that the total number is 9 acupressure points (See Figure 1). Each point was performed for 2 minutes with the thumb of the right hand and sedation technique, which is a circular motion opposite to the clock direction. The total amount of massage time was ± 18 minutes given 1 time a day before sleep at night between 20.00 to 22.00 pm for 2 days. The control group in this study only received treatment according to the standard of procedure of the ICCU in the hospital.

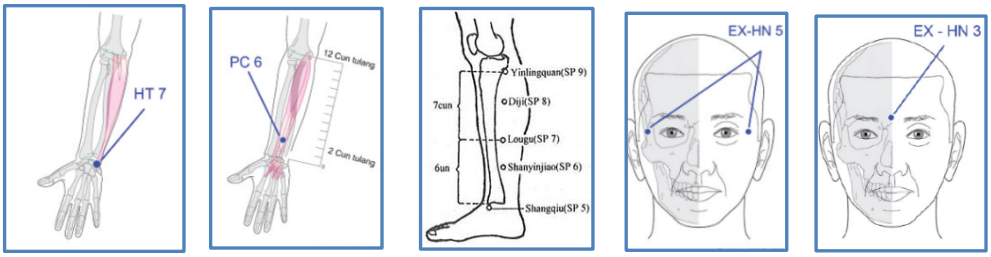

Figure 1 Acupressure point for sleep quality improvement and pulse rate[17]

Instruments

Quality Sleep Questionnaire was used for this study. This questionnaire is modified from the Pittsburgh Sleep Quality Index (PSQI) and St.Mary's Hospital (SMH)[18] sleep questionnaire adopted from Karota's study. Content validity of Quality Sleep Questionnaire had been analyzed by 3 experts in Psychological Nursing, Sleep and Medical & Gerontological Nursing from Prince of Songkla University, Thailand. Internal consistency of Cronbach's Alpha Coefficient of this questionnaire was 0.89.[19] To distinguish between good and poor sleep, researcher examined seven items of questions including total hours of sleep at night, bedtime, frequency of awakened due to sleep disturbance, tired feeling of drowsiness, wake up feeling fresh, sleep depth and sleep satisfaction. A good or bad score of sleep was identified by summing the score of items 1-7. If the score was ≤ 5, a good sleep quality was detected; if it was > 5, a poor sleep quality was detected. For the pulse rate, the bedside monitor was used, which was connected to the patients. The pulse value in the monitor represents the pulse frequency of the patient within a minute.

Ethical consideration

The study has met the ethical requirements of the Health Research Ethics Committee (K.EP.K) of Health Polytechnic of Ministry of Health (Poltekkes) of Semarang with No. 284 / KEPK / Poltekkes-Smg / EC / 2016. Prior to the research, respondents were given informed consent to provide information about the purpose, benefits and research procedures.

Data analysis

Data were processed and analyzed using SPSS. Mean and frequency distribution were described. Because data were in normal distribution, paired t-test was performed for paired group, and

independent t-test for unpaired group with significant value <0.05.

RESULTS

Table 1 shows that the majority of the respondents aged 41-59 years, which was 60% in the treatment group with mean 59.76 years old and 56% in the control group with mean 59.88 years old. Most of them in the treatment and control group were males (88%; 84%), had elementary school background (52%; 60%), and working in the private sectors (48%: 40%). The homogeneity test showed p-value >0.05 in each variable, which means that there was no significant difference of respondents' characteristics in the intervention and control group.

Table 1 Homogeneity and distribution of respondents based on gender, age, education, and job and working status

Variable	Intervention		Control		*p-value*
	n	%	n	%	
Age (years)					0.179
41-59	15	60.0	14	56.0	
> 60	10	40.0	11	44.0	
(Mean ± SD)	(59.76 ± 10.647)		(59.88± 8.880)		
Gender					0.425
Male	22	88.0	21	84.0	
Female	3	12.0	4	16.0	
Educational level					0.739
Elementary school	13	52.0	15	60.0	
Junior high school	3	12.0	3	12.0	
Senior high school	7	28.0	5	20.0	
Graduate level	2	8.0	2	8.0	
Job					0.563
Not working	2	8.0	2	8.0	
Farmer	8	32.0	12	48.0	
Private	12	48.0	10	40	
Civil servants, Military/Police	3	12.0	1	4.0	

Table 2 Frequency distribution of respondents based on the quality of sleep in patients with AMI

Sleep Quality	Intervention				Control			
	Pretest		Posttest		Pretest		Posttest	
	n	%	n	%	n	%	n	%
Good	0	0	18	72.0	0	0	0	0
Poor	25	100.0	7	28.0	25	100.0	25	100.0
(Mean±SD)	10.52±1.327		5.00±1.225		10.40±1.414		9.92±1.441	

During pretest, both intervention and control groups had poor sleep quality (100%). But there was a sharply change of sleep quality during posttest in the intervention group. Of total patients, 72% of them had a good sleep quality and 28% had a poor quality. However, there was no change of sleep quality in the control group.

Table 3 Frequency distribution of pulse rate in patients with AMI

Group	n	Mean±SD	Minimum	Maximum
Intervention group				
Pretest	25	89.68±11.142	70	108
Posttest	25	79.04±5.719	68	89
Control group				
Pretest	25	89.04±9.650	70	104
Posttest	25	86.60±6.916	70	96

As shown in the table 3, it can be seen that the pulse rate before given intervention was 89.68 ± 11.142 with the lowest score was 70 and the highest was 108. There was a change in pulse rate after given intervention with a mean value of 79.04 ± 5.719 with the lowest value of pulse rate was 68 and the highest was 89. While there was no change of the pulse rate during pretest and posttest in the control group with the mean value of posttest was 86.60±6.916, with the lowest value was 70 and the highest was 96.

Table 4 Quality of sleep in the intervention and control group using paired t-test

Group	Quality of Sleep	n	Mean	SD	*t*	*p-value*
Intervention	Pretest	25	10.52	1.372	22.461	0.000
	Posttest	25	5.00	1.225		
Control	Pretest	25	10.40	1.414	1.953	0.063
	Posttest	25	9.92	1.441		

Table 4 shows that there was statistically significant increase of quality of sleep in the intervention group with p-value 0.000 (<0.05). However, there was no significant increase of the sleep quality in the control group with p-value 0.063 (>0.05)

Table 5 Pulse rate in the intervention and control group using paired t-test

Group	Pulse rate	n	Mean	SD	*t*	*p-value*
Intervention	Pretest	25	89.68	11.142	6.725	0.000
	Posttest	25	79.04	5.719		
Control	Pretest	25	89.04	9.650	2.672	0.013
	Posttest	25	86.60	6.916		

Table 6 The difference in mean of sleep quality and pulse rate in posttest in the intervention and control group using independent t-test

Variable	*Posttest*			
	n	Mean ± SD	*t*	*p-value*
Sleep quality				
Intervention group	25	5.00±1.225	13.008	0.000
Control group	25	9.92±1.441		
Pulse rate				
Intervention group	25	79.04±5.719	4.212	0.000
Control group	25	86.60±6.916		

As shown in the Table 5, it is indicated that there was statistically significant decrease of pulse rate in the intervention group and control group with p-value 0.000, 0.013 (<0.05) respectively. However, the decrease of the value of pulse rate in the intervention group (10.64) was higher than the pulse rate in the control group (2.44).

Independent t-test as shown in the table 6 shows p-value 0.000 (<0.05), which indicated that there were significant differences in sleep quality and pulse rate between intervention and control group.

DISCUSSION

The results of this study revealed that there was a significant effect of acupressure on the increase of the quality of sleep in patients with acute myocardial infarction. This is consistent with the study in the increase of sleep quality in acute coronary syndrome patients (ACS) after given acupressure intervention at Fengchi point (GB 20), shenmen (HT7), yongquan (KL1), ying-tang (EX-3) with a duration of 18 minutes for 3 days.[7] Similar results with the study conducted by Shariati et al[15] indicated that there was an increase of sleep quality in 44 hemodialysis patients who were given acupressure at combining shenmen point (HT7), Hegu (Li4) and Sanyinjiao (SP6) for 15 minutes 3 times a week for a month. In addition, literature stated that the combination of the heart point of the shen men (HT-7), the neiguan heart lining (PC-6), and the spleen point of san yin jiao (SP-6) could decrease anxiety, and improve the sleep quality. While the other points of the tay (EX-5) and the yintang (EX-3) points provide a relaxed feeling.[17]

The increase of sleep quality in this study because the stimulation of sensory nerve cells at the acupressure point stimulates the nerve receptor in which the stimulus is sent to the center of the pons to the midbrain (periaquedectus), then the stimulus received by the periaquedectus conveyed to the hypothalamus, and from this hypothalamus through the descending nerve pathway of the endorphin hormone was secreted to blood vessels that provide a sense of calm, comfort and relaxation.[14,20] Thus, this calm condition, comfortable and relaxation will make respondents have the desire to sleep and can achieve long and deep sleep duration (NREM 4th stage sleep).[9] On the other hand, another effect of acupressure is to stimulate the release of serotonin hormone that regulates mood, sleep, and muscle contraction. Serotonin will act as a neurotransmitter that carries signals to the brain to activate the pineal gland producing the hormone melatonin, which will affect the suprachiasmatic nucleus (SCN) in the anterior hypothalamus of the brain in circadian rhythm settings, resulting in decreased sleep latency, nocturnal awakening, and an increase in total sleep time and sleep quality.[16]

Acupressure is a therapy with the principle of healing touch that shows more caring behavior on the respondents, so as to provide feelings of calm, comfortable, feelings that are more attention that can close the therapeutic relationship between researchers and respondents. From the psychological aspects, acupressure helps reducing anxiety of respondents.[16]

Additionally, acupressure as Chinese healing art and science is based on the theory of equilibrium, which is a harmonious and proportional balance between the yin and yang elements. Acupressure interventions at the point of cardiac, spleen and heart rest as well as the intervention in this study will strengthen the energies of the spleen yin element and weaken the heart and heart

membrane elements. The occurrence of the energy balance of the body will optimize the function and system of organs so that there can be health improvements including sleep quality, prevention, healing and recovery from illness.[17]

Besides, findings of this study also revealed there was a significant decrease of pulse rate after given acupressure intervention. In this regard, acupressure can promote blood circulation and Qi, harmony of yin and yang, and the secretion of neurotransmitters, thereby maintaining normal functioning of the human body and providing comfort.[15] Furthermore, manual stimulation of acupressure points has been shown to increase serotonin and endorphin production, which have a positive effect on emotional stability, and lead to relaxation and normalization of body functions. As a result, vital signs such as heart rate, breathing rhythm, and blood pressure will be balanced.[14]

In addition, the relaxation state due to stimulation at the acupressure point is physiologically related to neural branches of sympathetic and autonomous or central nervous system. Relaxation will inhibit the increase of sympathetic nerves, so the hormone that causes body dysregulation can be reduced. The parasympathetic nervous system that works against the sympathetic nerve will slow or weaken the body's internal workings.[21] Thus, there is a decrease in vital signs such as heart rate, breathing rhythm and blood pressure, and muscle tension. However, the findings of this study is in line with the study of wang et al which states that there is a decrease in pulse after acupressure at the shenmen point (HT7) for 15 seconds 3 times every 10 minutes with value ($p < 0.05$) in patients with chronic insomnia.[22] Similarly, in the study of McFadden et al,[23] acupressure yields reduced heart rate greater ($p = 0.043$) and faster ($p = 0.002$) significantly more than placebo acupressure during treatment.

CONCLUSION

Based on the results of this study, it can be concluded that acupressure has a significant effect on the increase of sleep quality and the decrease of pulse rate in patients with acute myocardial infarction. Thus, it is suggested that acupressure could be one of the nursing interventions for AMI patients to increase sleep quality and decrease of pulse rate. Further research is needed to determine the duration of effectiveness of acupressure in AMI patients.

Declaration of Conflicting Interest

None declared.

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Author Contribution

All authors contributed equally in this study.

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