Original Article

The Effect of Acupressure on Physiological Parameters of Myocardial Infarction Patients: A Randomized Clinical Trial

Marzieh Batvani[1], Hojatollah Yousefi[2], Mahboubeh Valiani[3], Javad Shahabi[4], Hossein Mardanparvar[1]

[1]Student Research Center, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, [2]Ulcer Repair Research Center, Department of Adult Nursing, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, [3]Nursing and Midwifery Care Research Center, Department of Midwifery, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, [4]Department of Cardiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Abstract

Background: Myocardial infarction is a major complication of coronary heart disease, and due to high mortality, is a part of important medical emergencies. Today, complementary and alternative medicine, as nonpharmacological and health promotion methods is considered. Therefore, this study was designed to evaluate the effectiveness of acupressure on physiological parameters of patients with myocardial infarction. **Materials and Methods:** This clinical trial was carried out among two groups and three stages in 2015. Study participants included 64 patients hospitalized in Iran, Isfahan Shahid Chamran hospital. Acupressure in five points and at any point for 2 minutes, twice per day for 3 days was done in the experimental group and as the same at a false point for the control group. Physiological parameters were recorded before, immediately, and 30 minutes after intervention. Data were analyzed using SPSS 20 and independent *t*-tests, Chi-square, Mann–Whitney test, repeated-measurements analysis of variance. **Results:** Independent *t*-test immediately and 30 minutes after the intervention showed that mean systolic blood pressure and arterial oxygen saturation in the intervention group were significantly lower and higher than the control group, respectively; however, mean diastolic blood pressure and heart rate were not significantly different. However, 30 minutes after intervention, diastolic blood pressure and heart rate were significantly lower in the intervention group. **Conclusions:** Acupressure in five points of body had a positive effect on physiological parameters, and showed that after a short time of interventions these parameters lead to promotion over time.

Keywords: *Acupressure, myocardial infarction, oxygen, vital signs*

Introduction

Nowadays, one of the most common diseases, which are known as the main reason of disability and mortality among human beings, is coronary artery disease.[1] One of the coronary artery diseases considered as the most important reason for mortality is heart attack.[2] Heart attack is one of the most important complications of coronary artery disease that has especially been considered due to its high rate of mortality, following psychological complications and problems and adverse impacts on patients' quality of life.[2] In Iran, heart attack is the first reason of death among 35 years and old population and the mean age of its prevalence is decreasing;[3] this could cause undesirable and even irreparable complications. Therefore, these patients must be hospitalized to receive better and more desirable services. Being hospitalized could be stressful for patients and causes different medical disorders in different patients; one of them is changes in physiological indices such as increased heart rate, increased respiratory rate, increased blood pressure, and decreased oxygen saturation.[4] After increased heart rate, the need for myocardial oxygen would be increased and hence diastolic systolic ratio would be shortened; consequently, the entire time of circulation would be decreased,[5] which would intensify ischemic processes and myocardial necrosis.[3] On the other hand, cardiovascular system is one of the most sensitive systems in the body which would experience immediate changes in heart rate and ventricular pressure after environmental and emotional changes such as tension and stress.[6] Therefore, providing special care with respect to physiological indices and controlling vital signs in heart attack patients are important and are effective measures in decreasing tension factors.[3] Although medicinal therapy is the main part of the treatment in

How to cite this article: Batvani M, Yousefi H, Valiani M, Shahabi J, Mardanparvar H. The effect of acupressure on physiological parameters of myocardial infarction patients: A randomized clinical trial. Iranian J Nursing Midwifery Res 2018;23:143-8.

Received: January, 2017. **Accepted:** August, 2017.

Address for correspondence:
Dr. Hojatollah Yousefi, Ulcer Repair Research Center, Department of Adult Nursing, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran.
E-mail: yousefi@nm.mui.ac.ir

Access this article online

Website: www.ijnmrjournal.net

DOI: 10.4103/ijnmr.IJNMR_83_16

Quick Response Code:

cardiovascular diseases,[4] considering the high prevalence of their side effects, most researchers would recommend nonmedicinal methods.[7] There are several methods, including complementary and alternative medicine, that nurses could use to help improve their patients' health.[8] Music therapy, touch therapy, and massage therapy are some of the nonmedicinal methods that could be used for controlling hemodynamic condition. Evidences show that these methods could have important physiological and psychological benefits in controlling patients' hemodynamic condition. One of the nonmedicinal methods is acupressure.[4] Acupressure is a branch of acupuncture which is based on Chinese traditional medicine. In acupressure, touching techniques are used to balance the energy flow in the body, which can be performed by physicians, nurses, and even the patients themselves.[9] Although different studies have proven the effectiveness of this method on improvement of sleep quality, decreasing stress and anxiety, decreasing depression and changing vital signs in cancer patients, patients with multiple sclerosis, nulliparous women and hemodialysis patients,[10-13] but some other studies have reported the effect of acupressure from stimulatory to nothing on physiological indices. In this regard, Rajaei *et al*. reported that acupressure on P6 point would reduce some physiologic indices of patients before angiography, and Ye *et al*. showed no significant difference in heart rate and blood pressure.[14,15] Changes in physiologic indices in myocardial infarction patients could cause complications that would impact all the aspects of life in patients and disturb their quality of life. Effective strategies such as acupressure could be used to control physiologic indices in these patients. Moreover, considering the generalized use of complementary medicine, an affordable, nonaggressive, safe method which consumes little time, could be selected to improve the provided services for myocardial infarction patients and reduce the health care costs. Therefore, considering the importance of using nonmedicinal methods, this study was conducted to evaluate the effectiveness of acupressure on physiologic indices of myocardial infarction patients. We hope that our results could be useful in introducing this method and its effects on physiologic indices to the nurses' society so that patients would benefit from it.

Materials and Methods

This study was a three-stage clinical trial (IRCT2015110524889N1) conducted in the internal wards of Shahid Chamran hospital Isfahan in 2015. For this study, samples were selected from the study environment according to the inclusion criteria, and then, using random numbers tables, were randomly allocated into two groups – intervention and control groups. The researchers decided that every patient with odd number would be allocated to the intervention group and those with even numbers to the control group. After selecting the required numbers (required evens and odds) from the table of random numbers, all the numbers were placed in separate envelopes and put in a box. After samples were selected, according to the inclusion criteria by simple sampling, one card would be assigned to them, and then based on the number on the card, they would be allocated to intervention (odd number) or the control (even number) group. Sample size was calculated to be 32 for each group with a confidence interval of 95%, test power of 80%, and 10% for probable sample loss. Inclusion criteria included willingness to participate in the study, age 35–75 years, having myocardial infarction according to the diagnosis by a cardiologist, having their first myocardial infarction, having passed the acute phase of the diseases and ICU, being conscious about the place, time, and their surroundings, not having any specific problem in the place of applying acupressure, not having any psychological disorder, and hemodynamic stability on the day of applying the intervention. The exclusion criteria were being absent for two sessions during the intervention, unwillingness to participate in the study, patient's death or discharge from hospital during the intervention, physician's diagnosis about patient's inability to continue the intervention, and having any emergency condition during the intervention that would require urgent intervention by nurses or physicians.

Data collection tools were demographic characteristics questionnaire, Alpakado standard mercury sphygmomanometer (made in Japan), and Medical Rossmax fingertip pulse oximeter (Rossmax International Ltd 12F, No. 189, Kang Chien Road Taipei, 114. Taiwan). One type of sphygmomanometer, pulse oximeter, and stethoscope were used for all the patients, and all the devices were calibrated before the study. During the intervention, all patients received the usual treatment for heart attack, and acupressure was performed along with that treatment. Researchers were trained by an expert professor in acupressure and were all approved.

Background information was recorded for each patient using their medical file and interviewing them or their relatives. Before performing acupressure, the procedure was explained to the patient, and then the patient was asked to lie on their back; the researcher first rubbed her hands together to warm them up a little before performing the intervention. Researcher's hands were clean and their nails were shortened so that they would not scratch patient's skin during the intervention. The patients were maintained in a quiet and peaceful state for 10 min and then the acupressure procedure was started. The intervention was designed in a manner that it would not intervene with ward's routine measures, physicians' rounds, and patients' rest.

The method of determining acupressure points was approved by advising with a skilled person and the amount of applied pressure was exercised using the standard 20 g to 6 kg scales. Full reliability of the applied pressure by both hands of the researcher was approved by the

consulting professor after repeating with an average of 3–4 kg on the scale.

The acupressure points that were used in this study were HT7, P6, P7, LI4, and Lv3. Based on the principles of traditional Chinese medicine, these points are generally related to pain and HT7, P6 and P7 points are specifically related to heart and pericardium. Each point was pressured for 2 min using the tip of the thumb of both hands[16] in a way that the applied pressure was equal to 3–4 kg; if performed correctly, the patient would have a sense of heaviness, numbness, and warmness at the pressure point. During the first minute, the pressure was continuous, and during the second minute, it was applied pulsatively; the amount of the pressure was as much as one third of the researcher's thumb would become pale. It must be noted that points were pressured on both sides of the patients at the same time with both hands. For female patients, the intervention was performed by a female researcher and for male patients it was performed by a male colleague. On the day of the intervention, the patient would be laid on their back, which is the desirable position, in their room on their bed, and their systolic blood pressure, diastolic blood pressure, heart rate, and arterial oxygen saturation were measured and recorded as their physiologic indices 10 min before the intervention. Then, the researchers performed acupressure on the mentioned points by both hands for the intervention group for 2 min, during 3 days, twice a day, which was a total of 6 sessions from 10–12 AM and 3–5 PM.[17] Then, immediately after the intervention and 30 min later, the mentioned physiologic indices were measured again and recorded.[14] In the control group, 10 min before the procedure, patients' physiologic indices were measured and recorded; after explaining the procedure to them and laying them on their back, false points which were about 1 cm away from real points, shim points, were spuriously pressured for 2 min.[17] Immediately after the procedure and 30 min later, the physiologic indices were again measured and recorded. After finishing 6 sessions of the intervention, the mean of the indices was recorded and analyzed based on the study goals. Data were analyzed using SPSS 20 (IBM Corporation, New York , United States).

Ethical considerations

After taking ethics code (No. 394457, 27/7/2015) from the ethics committee of the Isfahan University of Medical Sciences and obtaining permission from the authorities of Shahid Chamran hospital, the study goals were explained to the participants and a written informed consent was obtained from all participants.

Results

Among the 71 participants who met the inclusion criteria, 3 patients from the control group were excluded due to discharge from hospital, 2 patients due to unwillingness to participate in the study; and 2 patients were excluded from the intervention group due to discharge from the hospital. Thus, the study was conducted among 64 participants. Results showed that participants of the intervention and control group were statistically similar regarding variables such as age, sex, educational level, marital status, employment status, and history of cardiovascular drugs consumption [Table 1]. According to independent *t*-test, 10 min before the intervention, the difference between the mean of systolic blood pressure ($p = 0.100$), diastolic blood pressure ($p = 0.890$), heart rate ($p = 0.740$), and arterial oxygen saturation ($p = 0.070$) of the intervention and the control group were not statistically significant [Table 2]. According to repeated-measurements analysis of variance, the mean of systolic blood pressure ($p = 0.001$), diastolic blood pressure ($p = 0.001$), and heart rate ($p = 0.001$) in the intervention group were significantly decreased over time. Furthermore, the mean of arterial oxygen saturation was significantly increased overtime in the intervention group ($p = 0.001$) [Table 2]. Based on repeated-measures analysis of variance, the mean of systolic blood pressure ($p = 0.620$), diastolic blood pressure ($p = 0.997$), heart rate ($p = 0.170$), and arterial oxygen

Table 1: Comparison of demographic variables and drugs between study and control groups

Variable	Number (%)		*p*
	Study group	Control group	
Sex			
Female	13 (40.6)	13 (40.6)	1.00*
Male	19 (59.4)	19 (59.4)	
Education (%)			
Illiterate	7 (21.9)	10 (31.2)	0.33**
Under diploma	17 (53.1)	16 (50)	
Diploma	6 (18.8)	6 (18.8)	
College	2 (6.2)	0 (0.0)	
Marital status (%)			
Married	27 (84.4)	26 (81.3)	0.92*
divorced	1 (3.1)	1 (3.1)	
Wife died	4 (12.5)	5 (15.6)	
Job (%)			
Employed	2 (6.2)	0 (0.00)	0.33*
Self-employed	13 (40.7)	12 (37.5)	
Retired	4 (12.5)	5 (15.6)	
Worker	0 (0.00)	2 (6.2)	
Housewife	12 (37.5)	13 (40.7)	
Others	1 (3.1)	0 (0.0)	
Drug			
Nitrate	2 (6.25)	4 (12.5)	0.34*
Beta blocker, Anticoagulant	5 (15.6)	10 (31.3)	0.06*
Ca blocker	2 (6.25)	2 (6.25)	0.5*
None	23 (71.9)	16 (50)	0.07*
Age			
Mean (SD)	58.3 (9.8)	59.4 (0.68)	0.68***

* Chi-square test. ** Mann–Whitney test. *** Independent *t*-test

Table 2: Comparison of mean systolic, diastolic blood pressure, heart rate, and O_2 sat at different times between study and control groups

Physiological indicators	Times	Mean (SD)		*t*-test (*p*)
		Study group	Control group	
Systolic Blood Pressure	10 min before intervention	127.7 (14.3)	134.2 (16.4)	1.68 (0.10)
	Immediately after intervention	123.7 (14.3)	134.1 (16.5)	2.70 (0.01)
	30 min after intervention	120.7 (13.9)	133.7 (16.3)	3.44 (0.01)
	P-value (ANOVA)	*F*=73.97, *p*=0.001	*F*=0.48, *p*=0.62	-
Diastolic Blood Pressure	10 min before intervention	81.5 (7.6)	81.2 (7.8)	0.14 (0.89)
	Immediately after intervention	78.7 (7.3)	81.3 (7.9)	0.14 (0.19)
	30 min after intervention	76.4 (7.6)	81.2 (7.9)	2.47 (0.01)
	P-value (ANOVA)	*F*=82.70, *p*=0.001	*F*=0.003, *p*=0.997	-
Heart Rate	10 min before intervention	79.8 (7.3)	79.2 (6.7)	0.33 (0.74)
	Immediately after intervention	77.2 (7.1)	79.6 (6.9)	1.36 (0.18)
	30 min after intervention	75.6 (7.1)	79.5 (6.9)	2.24 (0.02)
	P-value (ANOVA)	*F*=62.73, *p*=0.001	*F*=1.92, *p*=0.17	-
O_2 sat	10 min before intervention	93.6 (2.8)	92.6 (1.1)	1.85 (0.07)
	Immediately after intervention	94.9 (2.9)	92.7 (1.1)	4.12(<0.01)
	30 min after intervention	95.3 (3.2)	92.7 (1.1)	4.39(<0.01)
	P-value (ANOVA)	*F*=173.90, *p*=0.001	*F*=2.04, *p*=0.15	-

saturation (p = 0.150) showed no significant differences at different time intervals in the control group. Independent *t*-test showed that immediately after procedure the mean of systolic blood pressure (p = 0.009) and arterial oxygen saturation (p = 0.001) were significantly lower in the intervention group than the control group, but the difference between their diastolic blood pressure (p = 0.190) and heart rate (p = 0.180) was not significant. Independent *t*-test showed that 30 min after the intervention the mean of systolic blood pressure (p = 0.001), diastolic blood pressure (p = 0.016), and heart rate (p = 0.028) were significantly lower in the intervention than the control group; moreover, the mean of arterial oxygen saturation (p = 0.001) was significantly higher in the intervention group than the control group [Table 2].

Discussion

Results of this study showed that using acupressure as a nonmedicinal method could be effective on the relative improvement of physiologic indices of myocardial infarction patients immediately after and 30 min after the intervention, whereas no significant changes were observed in the control group regarding physiologic indices. Results of the study by Arami *et al*. in 2015 which evaluated the effect of acupressure on heart Shen Men points (HT7) and the third eye on the anxiety in patients undergoing coronary artery angiography also reported similar results.[18] Rajaei *et al*. in 2015 evaluated the effect of acupressure on P6 point on the physiologic indices of patients undergoing coronary artery angiography, showing a significant difference between both groups regarding their respiratory rate and systolic blood pressure after the intervention.[14] The study of Fabrian *et al*. in 2016 evaluated the effect of acupuncture on the Chengjiang and Yintang points in patients with cardiac arrhythmia and neurocardiogenic syncope and measured the blood pressure, heart rate, and oxygen saturation respiratory rate of patients after the intervention. Their results showed that simulation of these points had an immediate effect on the autonomic nervous system, thus maintaining homeostasis and energy balance of the body.[19]

The study of Taghizadeh *et al*. in 2012, which evaluated the effect of reflexology massage and stroke massage on physiologic indices of myocardial infarction patients, showed that the mean of systolic and diastolic blood pressure, respiratory rate, and pulse were lower in the evening shift than the morning shift and the mean of arterial oxygen saturation was increased in both the evening and morning shifts; however, only the difference between oxygen saturation levels was statistically significant. In the reflexology massage group, the mean of systolic blood pressure after the evening massage, the mean of pulse at both the evening and the morning shifts, and the mean of respiratory rate after the evening massage were decreased; however, only the difference between the mean of pulse of the morning shifts (p = 0.010) and the evening shifts (p = 0.014) was statistically significant.[3] Unlike the results of the present study, results of the study by Atri *et al*. in 2012 showed that the mean of pain intensity was decreased in the intervention group; however, results showed no significant difference between both the groups regarding their vital signs at different time intervals (p > 0.05).[13] The researcher believes that this difference might be because of the difference between study populations because Atri *et al*. studied patients after surgery and the process of surgery and its pain could affect physiologic parameters.

In a study conducted by Ling Ye *et al*. in Taiwan in 2015 to evaluate the effect of ear acupressure on physiologic indices and quality of life in high blood pressure patients a significant difference was reported between both groups regarding their quality of life before and after the intervention. However, the mean of heart rate showed no significant difference between both the groups before and after the intervention; only the mean of diastolic blood pressure showed a statistically significant difference between both groups after the intervention whereas the difference in the systolic blood pressure showed no significant change after the intervention.[15] The reason for these differences might be that Ling *et al*. in their study performed ear acupressure, but in the present study acupressure was performed on five different points all over the body, which can be the reason for significant results. In the study of Yuhai *et al*. in 2014 aimed to evaluate the effect of moxa smoke on blood pressure, respiratory rate, heart rate, ECG, and oxygen saturation of healthy adults in China, repeated-measures analysis of variance showed no significant difference between both groups before, during, and after the intervention.[20] The reason for this difference might be that they used moxa smoke in their study on healthy participants while the present study used acupressure on heart attack patients. A study by Christina *et al*. in 2012 reported that, when comparing both groups, heart rate was significantly decreased and this decrement was faster in the intervention group; however, blood pressure showed no significant changes and the author believed that this was due to consumption of antihypertensive drugs by the patients.[21]

Moji *et al*. in their study conducted in 2011 in Hong Kong evaluated the effect of electrical nerve stimulation of the skin on the hemodynamic condition of patients after open heart surgery. Results showed that, in the intervention group, heart rate was significantly decreased in comparison to the other two groups and that the blood pressure was significantly increased in comparison to the other two groups.[22]

Also in line with the results of the present study, results of the study by Zorriasatein *et al*. in 2013 aimed to determine the effect of foot massage on physiologic indices of male and female patients hospitalized at special wards in Tehran indicated that systolic blood pressure, diastolic blood pressure, and heart rate were decreased and oxygen saturation was increased right after and 5 min after the massage in male and female patients and the difference between before and after the intervention was statistically significant.[23] There are some limitations in this study: sampling limit to a hospital, patients' cultural backgrounds may affect the physiological parameters, and the short time of evaluation after intervention.

Conclusion

According to the results of the present study, acupressure could be an effective method for stabilizing physiologic indices in myocardial infarction patients. Changes in physiologic indices in these patients could have complications that would impact their quality of life. Due to drug side effects and high costs, patients would prefer not to consume drugs, and acupressure could be introduced as a nonaggressive nursing intervention. Therefore nurses could improve the quality of health care services with using the wide range of this affordable, nonaggressive, and safe complementary medicine that consumes little time.

Acknowledgement

This article was derived from a master thesis with project number 394457, Isfahan University of Medical Sciences, Isfahan, Iran. We appreciate Clinical Research Development Center of Chamran hospital of Isfahan. We are also grateful to all patients who participated in this study.

Financial support and sponsorship

Isfahan University of Medical Sciences.

Conflicts of interest

Nothing to declare.

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