Critical Care Nursing

Iran J Crit Care Nurs. 2014;6(4):235-242

Journal home page: www.inhc.ir

Effect of foot reflexology on anxiety of patients undergoing coronary angiography

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ARTICLE INFO

Article type:
Original article

Article history:
Received: 5 Apr 2013
Revised: 9 Nov 2013
Accepted: 23 Nov 2013

Key words:
Foot reflexology
Anxiety
Artery coronary angiography
Complementary medicine

ABSTRACT

Aims: Although artery coronary angiography is the most important method of diagnosing cardiovascular diseases, it is an important factor in increasing patients' anxiety. There are different medicinal and non-medicinal methods to decrease anxiety. This paper tried to study "the effect of foot reflexology on the anxiety of patients undergoing artery coronary angiography".

Methods: In this clinical trial study, seventy patients undergoing artery coronary angiography in Valiasr hospital Affiliated with Medical Sciences University of Birjand were assessed in 2013.They were selected through convenience sampling and divided randomly into two intervention and control groups. Spielberg's state-trait inventory was used to collect data. Any patient in the intervention group received foot reflexology for 20 minutes and patients in the control group received no reflexology. The extent to which patients felt anxious in the two groups before, immediately after, and half an hour after the intervention was measured, and the data were analyzed in SPSS 16 software by Chi-square and independent t-test.

Results: There was a significant difference between the two groups' anxiety mean scores before, immediately after, and half an hour after the intervention ($p=0.096$). Also there was significant difference between changes in anxiety mean scores before, immediately after, and half an hour after the intervention in control and intervention groups ($p<0.001$).

Conclusions: Considering the results of this study regarding the effect of foot reflexology massage on anxiety decrease of patients undergoing coronary angiography, in the case of results conformity in larger studies, it can be used as a safe, effective, applicable and affordable intervention in decreasing patients' anxiety in health care centers and hospitals.

Please cite this paper as:
Mahmoudirad Gh, Ghaedi Moslo M, Bahrami HR. Effect of foot reflexology on anxiety of patients undergoing coronary angiography. Iran J Crit Care Nurs. 2014;6(4):235-242.

1. Introduction

Artery coronary disease is the most common chronic, progressive and life threatening diseases [1] which includes one-third of the death in the world. In the early twentieth century, the highest mortality rate was related to developed countries, but nowadays its rate is increasing in developing countries, that in the recent years 78% of the death due to artery coronary are related to these countries [2]. Also in Iran cardiovascular diseases are highly

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common and the age of artery coronary diseases is decreasing [3] and nowadays it is counted as the most important cause of death and disability, nearly 50% of death in Iran is due to coronary artery disease [4].

In order to determine the severity and extent of coronary artery disease, several methods; invasive and non-invasive ones are use, but finally the golden standard for diagnosis is angiography [5]. Annually two million of heart patients in USA are under cardiac catheterization and by considering reliability and accuracy of this diagnostic study, its number is increasing everyday [6].

The researches regarding anxiety before angiography show that more than 82% of the patients suffer from stress and anxiety before angiography that influences this diagnostic test remarkably [7].

Anxiety is an emotional state that is cleared by feeling, tension, anger, concern, fear and increased activity of the autonomic nervous system and leads to physiological and mental response and is along with increased heartbeat, blood pressure and cardiac output [8].

Anxiety before angiography is an inevitable phenomenon, but when its amount is more than the usual extent, then it can have remarkable negative effect on different parts of the body specially the heart. So anxiety before angiography should be resolved or decreased through an appropriate method to prevent its complications [9].

Anxiety control methods include: pharmacological and non-pharmacological methods, considering drugs side-effects, their price and limitation of treatment success in pharmacological method, using a low-cost method for keeping physiologic parameters stable, reducing anxiety and resolving multiple drug problem and drug interaction in these patients is essential [10].

There are some studies regarding non-pharmacological methods in recent years; among these interventions, relieving pain and anxiety by using complementary medicine methods can be pointed out [11]. One of the branches of complementary medicine is foot massage therapy which is doing through reflexology [12]. It is hundreds of years that massage reflexology method is used as a useful therapeutic method in China, Egypt and India [13].

Reflection points are found in metatarsus or palm that reflect all parts of the body like a small mirror [14]. One of the theories that is about metatarsus reflexology method is that mental pressures and tensions are responsible for 75% of the human's mental problems and since there is 7000 nerves in every leg , feet massage and neurons stimulation make relaxation and reduce tension and therefore returns the body into balance [15].

Some studies confirm the effect of reflexology massage on anxiety; patients' anxiety before coronary artery bypass graft surgery [3], anxiety of cancer patients undergoing chemotherapy [16], anxiety during confinement among nulliparous women [17] can be pointed out in this among. But in the study of Razmjou et al. (2011) with the aim of "the effect of foot reflexology on pain and anxiety in women after elective cesarean" [18] and Gounarsedotir et al. (2005) for "investigating the effect of reflexology massage on anxiety decrease of the patients undergoing artery coronary bypass graft surgery", reflexology method had no effect on decrease of anxiety [19]. Also Tiran emphasizes more randomized clinical trial studies regarding reflexology [20].

There are some contradictions in the results of different studies regarding relationship between anxiety and reflexology massage. Also coronary artery angiography is developing every day as an effective diagnostic study. There wasn't any study about the effect of reflexology method on the amount of anxiety; so the researcher decided to do a research with the aim of "investigating the effect of foot reflexology method on the amount of patients' anxiety before artery coronary angiography".

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2. Methods

This quasi-experimental study was a kind of case-control clinical trial with this registration number: IRCT2013052813500N1. Study population was patients candidate for angiography in Valiasr hospital affiliated to Birjand Medical Sciences University in 2013. This study was done for investigating the effect of metatarsus reflexology massage on the anxiety level of the patients undergoing artery coronary angiography, it was done on seventy patients who were selected randomly and were divided into two groups of 35 people (intervention and control). Before starting the study, the researchers (male and female) had necessary educations for determining points and the method of reflexology massage under the supervision of a Chinese clinical medicine specialist, and after being confirmed by the Chinese clinical medicine specialist, sampling was done after taking permission from the authorities of the hospital of the study.

Inclusion criteria included: patient's willingness to participate in the study, to be under angiography procedure for the first time, no history of anxiety or mental illness, over 75 thousand platelet count and not having hemorrhage disease, not having ulcer or active infection in the massage position, lack of using anti-anxiety drug or sedative in 48 hours before massage, no history of reflexology massage in the last three months. Exclusion criteria included: lack of patient's satisfaction to continue participation in the study, cancellation of the patient's angiography procedure during the study and occurrence of any problems during the study (chest pain, asthma, etc.).

Data collection was done through a two-part questionnaire. The first part of the questionnaire was related to patient's demographic information including: age, gender, education level, marital status, employment status and the second part was Spielberg's anxiety standard questionnaire. Reliability and validity of this questionnaire was confirmed in several studies in Iran. Bayani et al. reported its reliability 0.92 by Cronbach's alpha [21]. Dehghan Niri et al. also confirmed content of Spielberg's anxiety test and its reliability was reported 0.94 by Cronbach's alpha [22]. Spielberg's anxiety standard questionnaire has two scales of state and hidden anxiety (in this study state anxiety scale was used). State anxiety questionnaire included 20 questions, the lowest score for anxiety is 20 that mean lack of anxiety and the highest score is 80 which means the highest level of anxiety. Scores of 20 to 39 shows mild anxiety, 40 to 59 shows moderate anxiety and 80 to 100 shows severe anxiety.

There were some explanations about the project to the people eligible to participate in the study the night before angiography and in the case of their willingness to participate in the study, informed consent was taken from them. Samples were randomly divided into control or intervention groups (by using bead number 1 and 2 which was chosen by the patient himself/herself). Then every one of the patients, unaccompanied were separately in a private room which was calm and had enough light then male and female researchers by considering patient's gender (for observing ethical principles) measured the amount of patient's anxiety before intervention by using situational Spielberg's questionnaire and started intervention.

In the intervention group the amount of anxiety was assessed in three steps: before, immediately after and half an hour after intervention. The patient was in a quite comfortable situation for this work and every foot's solar grid point (solar grid point in the border of one-third of upper and middle of metatarsus, in the part that foot lines are formed at the time of its flexion, along the second and third fingers) massage was done for ten minutes (totally twenty minutes). Also in control group by providing the same conditions as intervention group (patients in control group like intervention group were in a private room, they were unaccompanied and the room was calm and with the enough light), but without doing intervention, the amount of anxiety was

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measured before, immediately after and half an hour after intervention. Data analysis was done by SPSS16 software and (p=0.05) was counted significant statistically. Chi-square was used for comparing two intervention and control groups in the approach of individual survey features (gender, educational level, marital status, residence status) and independent t-test was used foe age, for comparing the mean of anxiety score in three stages in two intervention and control groups intergroup ANOVA test (repeated measures) and for comparing the mean of anxiety scores in the two groups at different times independent t-test was used.

3. Results

After sampling, statistical tests showed that the two groups were not statistically significant and they were the same regarding demographic features: age, gender, marital status, residence status and education level (table 1).

Intergroup ANOVA test (Repeated measures ANOVA) showed that there is statistical significant difference between mean of anxiety score in intervention group before, immediately after and half an hour after intervention (p<0.001) (table 2).

Results of Bonferroni post hoc test also showed significant difference in the mean of anxiety score of intervention group before and

Table 1: Demographic features of the two groups of the study

Demographic variable		Group therapy: Reflexology massage frequency (percent)	Group therapy: control frequency (percent)	p-value
Gender	female	15 (21.4)	14 (20)	p=0.8
	male	20 (28.6)	21 (30)	
Marital status	single	0	0	
	married	35 (100)	35 (100)	
Residence status	rural	22 (31.4)	26 (37.1)	p=0.303
	City	13 (18.6)	9 (12.9)	
Education level	Illiterate	27 (38.6)	20 (28.6)	p=0.35
	Secondary education	5 (7.1)	9 (12.9)	
	Diploma	2 (2.9)	3 (4.3)	
	Associate diploma	1 (1.4)	1 (1.4)	
	BA	0	2 (2.9)	
Age	mean ±standard deviation	59.7±10	58.5±9	p=0.651

Table 2: Comparing the mean of anxiety score in two reflexology massage group and control group based on the times of intervention

Treatment group	Intervention time	Mean±standard deviation	p-value
Reflexology massage	Before intervention	8.45±53.68	p<0.001
	Immediately after intervention	8.73±44.97	
	Half an hour after intervention	10.96±27.29	
Control	Intervention time	11.8±48.8	p<0.001
	Before intervention	11.73±49.2	
	Immediately after intervention	10.48±50.43	

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immediately after intervention (p<0.001) before and half an hour after intervention (p<0.001) and immediately after and half an hour after intervention (p<0.001). The mean of anxiety scores had been reduced after intervention in compare with before that and it caused significant difference in the level of anxiety in different stages.

The mean of anxiety scores had been increased in control group immediately and half an hour after intervention and intergroup ANOVA test (Repeated measures ANOVA) showed that there is statistical significant difference between the mean of anxiety score in control group before, immediately after and half an hour after intervention (p=0.001) (table 2).

Also results of Bonferroni post hoc test showed significant difference in the mean of anxiety score in control group before intervention and half an hour after intervention (p=0.009) immediately after intervention and half an hour after intervention (p=0.032). The mean of anxiety score had been increased after intervention in compare with before that and it caused significant difference in the level of anxiety in different stages.

Independent t-test showed that there is statistical significant difference between the mean of anxiety score immediately after intervention in intervention and control groups (p<0.09) and the mean of anxiety score immediately after intervention in intervention group in compare with control group was decreased more and it was significant.

Independent t-test showed that there statistical significant difference between the mean of anxiety score in intervention and control groups half an hour after intervention (p<0.001) and the mean of anxiety score half an hour after intervention in intervention group in compare with control group was decreased more and it was significant.

Paired t-test showed that there is significant statistical difference between the mean of anxiety score changes in two reflexology and control groups before and immediately after intervention (p<0.001), before and half an hour after intervention (p<0.001) and immediately and half an hour after intervention (p<0.001).

4. Discussion

Results of this study indicate that there was significant difference in the mean of anxiety score in intervention group before, immediately after and half an hour after intervention (p<0.001). the was no significant difference in the mean of anxiety score in two groups before intervention, but there was significant difference in the mean of anxiety score in the two groups immediately and half an hour after intervention (p<0.001) findings of different studies also indicate that reflexology massage decreases patients' anxiety in different conditions, for confirming the results of the present study, it can be pointed to the study of Quattrin et al. (2006). Results of this study showed that reflexology decreases anxiety of the cancer patients undergoing chemotherapy significantly [16]. In the study of Moghimi Hanji et al. (2012) also foot reflexology decreased anxiety during nulliparous women's delivery significantly [17].

Results of the study of Makwikar et al. with the title of "evaluation of the anxiety level following reflexology" indicated that participants' situation anxiety was remarkably decreased after doing reflexology, but there was no change in personal anxiety [23].Also Kahangi et al. in their study (2011) achieved that the amount of patients' anxiety before artery coronary bypass graft surgery was decreased immediately after foot reflexology massage [3].

Torabi et al. (2012) in a study with the title of "the effect of foot reflexology massage and Benson's relaxation on the amount of anxiety and physiologic indicators of the hospitalized patients candidate for angiography" observed that reflexology massage and relaxation are effective in decreasing anxiety with the same degree [15].This study is in consistent with the present study with this difference that in the study of Torabi et al. anxiety score of control group was measured only before and half an

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hour after intervention. Also in the present study, Speilberg's questionnaire was used for measuring anxiety score and all the patients even illiterate ones could participate in the study, but in the study of Torabi et al. (VAS 0-10) was used that for participating in that, having at least reading and writing literacy was important.

Action mechanism of reflexology is not well recognized, but the kind of touch and pressure which is used in reflexology seems that have an effect beyond a simple touch. Reflexology makes local and physiologic systematic changes in the body and makes a deep state of relaxation and mind-body balance and also decreases symptoms related to stress that most of the people report increased feeling of general health and improvement [17]. Reflexology also may stimulate Endorphin and Ankfalin release that are natural pain relief and mood enhancers [24]. Reflexology is effective in increasing muscle comfort through improvement of blood pressure and stimulates parasympathetic nervous system [25].

Despite the positive effect of reflexology massage on anxiety decrease in this study and other studies, reflexology massage did not affect the amount of anxiety. It can be pointed to the study of Gonarsedotir et al. (2005) [19] which was done with the aim of "investigating the effect of reflexology massage on decreasing anxiety of the patients under artery coronary bypass graft surgery" that the results achieved in this study are in contradiction with the results of our study, May be it is because different number of the samples (five people in intervention group and 4 people in control group) and different method in intervention (measuring anxiety before intervention and five days of consecutive massage for thirty minutes and anxiety retest).

Also in the study of Gonarsedotir, inclusion criteria like lack of using antianxiety drugs or other methods of complementary medicine that lead to anxiety decrease are not considered, it can cause lack significant effect in the approach of anxiety level between two intervention and control groups, while in the present study such inclusion criteria are considered and none of the samples used antianxiety drug and sedatives 48 hours before intervention and they didn't use reflexology massage three months before.

In the study of Razmjou et al. (2011) [18] twenty minutes of reflexology did not cause anxiety decrease of women after elective cesarean which is not in consistent with our study. One of the reasons of this inconsistency can be different statistical population, also measuring anxiety and pain simultaneously with one scale (100-mm visual scale) and after cesarean section which can make problem for the patient in their segregation can be another reason.

This segregation is in a way that reflexology massage affect pain intensity but does not affect the anxiety level. But in the present study, the anxiety was measured by anxiety standard questionnaire before angiography that the amount of patients' anxiety is usually more. The mean of anxiety score in control group, before, immediately after and half an hour after intervention was significantly increased ($p=0.001$), although it was a minor amount which can be due to factors such as: the effect of questionnaire, related to unknowns, fear of anesthesia and surgery.

For controlling that, measurement of the pre and post mean changes difference was used in control and intervention groups. Also t-test showed statistical significant difference between changes of the mean before and after intervention in control and intervention groups. This difference indicates the effect of foot reflexology massage on anxiety of the patients under coronary artery angiography. Despite that the results indicate the effect of foot reflexology intervention on the amount of anxiety, may be indoctrination is used in this method and affects anxiety decrease which are among the restrictions of this study.

It is recommended to do other studies by using this method and other complementary medicine methods such as :acupressure, therapeutic touch

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and acupuncture, in order to compare their effect on anxiety level of different patients.

5. Conclusions

Considering results of this study based on the effect of foot reflexology massage on anxiety decrease of the patients under coronary artery angiography, in the case of results conformity in the broader studies, it can be used as a safe, non-invasive and affordable intervention that does not need anything except the nurse's hand and it can be used for decreasing patients' anxiety in all the situations and without any special tool in the health care centers and hospitals. It is suggested to do some studies with the aim of investigating stability of reflexology massage effect on the amount of patient's anxiety before angiography in different times, comparing reflexology with other non-pharmacological methods in decreasing patients' anxiety before surgery and invasive methods.

6. Acknowledgments

We thank and appreciate all the dear patients, authorities of Valiasr hospital and nurses of angiography ward and also respectable authorities of Birjand Midwifery and Nursing College who helped us in this project.

References

1. Mohammad HM, Farahani B, Zohour A, Panahi As. Self-care ability based on orem's theory in individuals with coronary artery disease. Iran J Crit Care Nurs (IJCCN). 2010;3(2):87-91. [Persian]
2. Yalfani A, Nazem F, Safiarian R, Jargeh M. The Effects of Exercise Cardiac Rehabilitation on Anxiety, Depression and Quality of Life in Coronary Artery Bypass Grafting Patients. Sci J Hamadan Univ Med Sci & Health Serv. 2012;19(1):39-44. [Persian]
3. Moeini M, Kahangi LS, Valiani M, Heshmat R. The effect of reflexotherapy on patients' vital signs before coronary artery bypass graft surgery. Iran J Nurs & Midwifery res. 2011;16(1):8. [Persian]
4. Soleymani Eslami A, Yaghobi A, Golestan A, Imani Sh, Hemati N, Holakoyi Naini K. Comparison of risk factors for coronary artery involvement in patients below and above 45 years. J Public Health, School Public Health. 2012;9(3):13-22. [Persian]
5. Hanifi N, Bahraminejad N, Mirzayi Khalilabadi T, Ahmadi F, Khani M. The effect of orientation program on stress, anxiety, and depression of patients under coronary angiography. Iran J Nurs Res. 2012;7(1):1-8. [Persian]
6. Aviles RJ, Messerli AW, Askari AT, Penn MS, EJ T. Introductory Guide to Cardiac Catheterization. 1st ed. Philadelphia. Philadelphia. 2004.
7. Heikkila J, Paunonen M, Laippala P. Nurses' ability to perceive patients' fears related to coronary arteriography. J Adv Nurs. 1998;28(6):1225-35.
8. Nekouei ZK, Yousefy A, Manshaee G, Nikneshan S. Comparing anxiety in cardiac patients candidate for angiography with normal population. ARYA Atherosclerosis. 2011;7(3):93. [Persian]
9. Afzali S, Masoudi R, Etemadifar S, Moradi M, Moghaddasi J. The effect of progressive muscle relaxation program (PMR) on anxiety of patients undergoing coronary heart angiography. J Shahrekord Univ Med Sci. 2009;11(3):77-84. [Persian]
10. Yeganehkhah MR, Mohamadi Shab Bolaghi F, Khankeh HR, Rahgozar M. The Effects Of Slow-Stroke Back Massage On Hypertension In Elderly. Iran J Nurs (Ijn). 2008;21(54):73-83. [Persian]
11. Memarian R, Vanaki Z, M K. Effects of Benson relaxation method on patients' anxiety before abdomen operation in mens' ward. Daneshvar Monthly Journal. 2002;8(2):65-70. [Persian]
12. Stephenson NL, Dalton JA. Using Reflexology for Pain Management A Review. J Holistic Nurs. 2003;21(2):179-91.
13. Sadeghi Shermeh M, Bozorgzad P, Ghafourian A, Ebadi A, Razmjouei N, Afzali M, Azizi A. Effect of foot reflexology on sternotomy pain after coronary tery bypass graft surgery. Iran J Crit Care Nurs (IJCCN). 2009;2(2):51-54. [Persian]
14. Mokhtari Nouri J, Sadeghi Shermeh M, Hajiamini Z. Effect of foot reflexology massage and Benson relaxation on anxiety. J Behav Sci. 2009;3(2):159-65. [Persian]
15. Torabi M, Salavati M, Ghahri Sarabi A. Effects of reflexology foot massage and Benson relaxation on anxiety and physiological parameters of patients candidate for angiography. Sci J Hamadan Nurs & Midwifery Faculty. 2012;20(1):63-71. [Persian]
16. Quattrin R, Zanini A, Buchini S, Turello D, Annunziata M, Vidotti C, et al. Use of reflexology foot massage to reduce anxiety in hospitalized cancer patients in chemotherapy treatment: methodology and outcomes. J Nurs Manage. 2006;14(2):96-105.
17. Moghimi Hanjani S, Shoghy M, Mehdizadeh Torzani Z, Ahmadi G, Khodadvastan Shahraki M. The Effect of foot reflexology on anxiety during of labor on primiparous. HBIJ. 2012;10(3):219-24. [Persian]
18. Razmjoo N, Yousefi F, Azizi H, Lotfolahizadeh M. Effect of foot reflexology on pain and anxiety in women following elective sesarean section. Iran J Obstetric, Gyneocol & Infertility. 2012;15(1):9-17. [Persian]
19. Gunnarsdottir TJ, Jonsdottir H. Does the experimental design capture the effects of complementary therapy? A study using reflexology for patients undergoing coronary artery bypass graft surgery. J Clin Nurs. 2007;16(4):777-85.
20. Tiran D, Chummun H. Complementary therapies to reduce physiological stress in pregnancy. Complementary Therapy Nurs & Midwifery. 2004;10(3):162-7.
21. Bayani A, Goudarzi H, Bayani A, KoocheKI A. The Relationship between the Religious Orientation and

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Anxiety and Depression of University Students. J Fundament Mental Health. 2008;10(39):209-15. [Persian]
22. Dehghan-nayeri N, Adib-Hajbaghery M. Effects of progressive relaxation on anxiety and quality of life in female students: a non-randomized controlled trial. Complementary Therapy Med. 2011;19(4):194-200. [Persian]
23. Mc Vicar A, Greenwood C, Fewell F, D'Arcy V, Chandrasekharan S, Alldridge LC. Evaluation of anxiety, salivary cortisol and melatonin secretion following reflexology treatment: a pilot study in healthy individuals. Complementary Therapies Clin Practice. 2007;13(3):137-45.
24. McCabe P. Complementary therapy in nursing practice: policy development in Australia. Australian J Holistic Nurs. 1996;3(1):4.
25. Mirzaee F, Kaviani M, Jafari P. Effect of reflexology on anxiety level in nuliparous women. Hayat. 2010;16(1). [Persian]

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