The Effect of Benson Relaxation on the Anxiety of Patients under Radial Angiography: A Randomized Clinical Trial

Yasser Moazami Goudarzi,[1] Fataneh Ghadirian,[2, *] Amir Vahedian,[1] and Amir Pishgoo[3]

[1]Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran
[2]Psychiatric Nursing Department, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran
[3]Baqiyatallah Hospital, Tehran, Iran

*Corresponding author: Fataneh Ghadirian, Psychiatric Nursing Department, School of Nursing and Midwifery, Tehran University of Medical Sciences, Nosrat St., Tohid Sq., Tehran, Iran. Tel: +98-2161054311, E-mail: f-ghadirianb@tums.ac.ir

Abstract

Background: Angiography is the gold standard test for the diagnosis of coronary artery disease; however, more than 82% of patients have stress and anxiety before they undergo angiography, which significantly effects the diagnostic results. One of the common complications of the angiography method through the radial artery is the occurrence of arterial spasm that is seen more in patients with severe anxiety. The current researchers believe that using Benson relaxation is effective in reducing the patient's anxiety.
Objectives: This study was designed to evaluate the Benson relaxation method in patients undergoing radial angiography.
Methods: This study was a clinical trial, which was performed on 60 candidate patients undergoing coronary angiography by radial method at Baqiyatallah Hospital during year 2017 (N = 60). The samples were randomly allocated to two groups, intervention and control. The information gathering tools were demographic questionnaire, the Beck Anxiety Inventory (BAI), and hemodynamic variables checklist. Data analysis was done with the SPPSS V16 software using Kolmogorov - Smirnov test, Mann - Whitney test, and paired - t test.
Results: The results showed a significant difference between the anxiety of the patients before and after the intervention in each group (P < 0.05). The comparison of the two groups with the paired - t test was not statistically significant. The anxiety of patients after the intervention was decreased, yet this decrease was not statistically significant.
Conclusions: Benson's relaxation method can be effective in reducing anxiety in angiography candidate patients. Accordingly, it may also be effective in reducing the occurrence of radial artery spasm.

Keywords: Anxiety, Benson Relaxation, Radial Angiography

1. Background

Coronary angiography is one of the diagnostic and invasive methods for examining coronary arteries, as well as heart valve disease and the function of heart cavities (1, 2).

Every year, about 2 million Americans undergo coronary angiography. Yearly, about 16 to 18 thousand cases of angiography are performed annually in Iran (1, 3). Coronary angiography and angioplasty are usually performed through the femoral (thigh) and radian (hand) artery (4). In the recent years, diagnostic coronary angiography and coronary arteries angioplasty through the radial artery have been increasing around the world due to greater safety and patient comfort compared with other angiographic methods, either selectively or in emergency. Today, about 20% of diagnostic angiography cases are done in the United States by the radial method (5).

In the last three decades, coronary angiography through the radial artery has become a more favorable and desirable option for physicians than femoral angiography. Patients also prefer radial angiography for the sake of greater comfort and no need to maintain the supine position, starting physical and social activities better and earlier after the procedure, as well as shorter hospitalization, and lower costs of treatment (3).

Despite the benefits mentioned above, some factors, such as anxiety, have effects on the diagnostic results of radial angiography. Common factors involved in increasing the level of stress in patients, associated with angiography, are patient's previous experience, pain, unfamiliar environment, and fear of angiography and concern about the result of angiography, and may endanger them during angiography; therefore, an intervention to reduce the patient's anxiety is important (6, 7).

On one hand, radial artery spasm occurrence is one of

the most common complications that occurs during radial angiography (8). Radial artery spasm is the thinning of the diameter of the radial artery, which occurs suddenly and temporarily. Radial artery spasm causes pain and discomfort in the patient, as well as a decrease in the success rate of radial angiography (9), and in the event of higher intensity of spasticity and lack of prevention and treatment, it may lead to failure of radial angiography and alteration of vascular access to operating angiography (7, 10). Radial artery spasm can easily arise due to fear, anxiety, and pain (8, 11, 12), and shows the need to control anxiety to prevent spasticity and subsequent complications in radial angiography.

There are many ways to deal with anxiety, such as prescription of drugs (using premedication) and non - pharmacological treatments or the use of complementary therapies (1). Among others, the benefits of non - pharmacological treatments can be low costs, easy implementation, non - invasiveness, and also lack of chemical complications. Complementary therapies have been introduced as one of the nursing interventions in many articles for anxiety and pain relief and sometimes as a substitute for drug therapy, and relaxation is one of these treatments (3, 6). In the waiting period, before angiography, the nurse is the only member of the treatment team, who has close contact with the patient and can have an important role in reducing the level of anxiety (13).

Relaxation is a relative state of relief from physical and emotional effects due to stress, and is achieved in a variety of ways. Benson's Muscle Relaxation is a non - invasive and non - drug therapy focused on breathing exercises that are suitable for reducing anxiety and improving the patient's heart condition (1). This method is more desirable because learning and training do not require any special expertise; it requires no tools and equipment and can be used for all age groups. In Benson's relaxation, there is no muscle contraction exercise due to the possibility of increasing the number of pulses, respiration, and blood pressure, as well as the increased cardiac burden. Benson's muscle relaxation, besides having great advantages and being an easy method, has no complications for heart patients and patients can use it independently (1, 14). Although no study has been conducted to evaluate the effectiveness of this intervention in patients undergoing radial angiography, studies have shown that the use of this intervention in patients undergoing cardiac catheterization or femoral angiography will have a positive effect on various factors, such as hemodynamic indexes of patients (1, 15, 16).

2. Objectives

Considering that anxiety and stress reduction is one of the objectives of nursing care, the present study was designed with the aim of assessment of Benson relaxation effect on patient anxiety level after radial angiography.

3. Methods

This study was a randomized clinical trial that was performed on 60 patients under radial angiography in two groups of 30 individuals (relaxation and control groups). In this study, all candidates for radial angiography were selected conveniently, from the angiography section of Baqiyatallah - al - Azam (AS) Hospital between February 2016 and December 2017. The sample size was determined by the Cochrane formula and considering power of 80%, beta 20%, alpha 5%, and standard deviation 0.8. Based on the formula, at least 28 participants were needed in each group.

In the beginning, 60 samples were selected in terms of entry to ward (section) and according to inclusion and exclusion criteria. Selected samples were randomly allocated to the intervention (N = 30) and control group (N = 30).

The inclusion criteria were positive Allen test, age range of 15 to 65 years, no previous history of radial angiography, full awareness and awakening of patients before and after the intervention, having no hearing complications, having at least literacy (writing and reading), lack of visual impairment, not taking sedative drugs in the last 8 hours, history of psychiatric problems, history of drug use or similar drugs, such as oral methadone, occurrence of hematoma and radial arterial perforation during radial angiography, and use of other brain depression medications. Exclusion criteria were patient dissatisfaction to continue participation in the study, the occurrence of serious complications, such as dangerous arrhythmias for the patient during angiography, and patient death.

3.1. The Research Tools Included

Demographic data and clinical records form, including demographic quantitative variables (age, weight, height, Body Mass Index (BMI), History of admission to a specialty ward, history of neurological and psychiatric problems, history of taking sedative drugs), demographic qualitative variables (education, income, and occupation), underlying illnesses (the frequency of diabetes, hypertension, hyperlipidemia, and smoking), the researcher information record sheet (applied information registration

sheet) regarding the patient hemodynamic status examination before and after angiography, and Aaron Beck Anxiety Evaluation Scale Tool that evaluates the severity of clinical anxiety symptoms in individuals (validity and applicability evaluated in various studies). The Aaron Beck Anxiety Evaluation Scale Tool is a 21 - question scale that measures the severity of anxiety and impatience in people with mental health problems. The total score of each response is summed, with the total score of the subjects varying from 0 to 63. A score of less than 9 represented no anxiety, 10 to 20 mild anxiety, 21 to 30 moderate anxiety, and 31 and more, highly severe anxiety. The reliability of this questionnaire showed a high internal coefficient of 0.92% and the reliability of the test and retest showed a correlation of 75% over a week. The Beck anxiety inventory distinguishes diagnostic groups with anxiety from groups without anxiety. The Beck Anxiety inventory was normalized by Kaviani and Mousavi (2008) in Iran and the results indicated that the intended test had validity (r = 0.72, P < 0.001), reliability (r = 0.83, P < 0.001), and internal stability (0.92).

After the initial selection of the samples, the patient's informed written consent was obtained to participate in the study, and the data gathering forms were completed at least two hours before the angiography and immediately after angiography.

In the relaxation intervention group, the level of anxiety was first measured and then the relaxation technique was taught by simultaneous voice training for all patients and was exercised in the presence of the researcher. Half an hour before the angiography, Benson's relaxation method was performed for 15 to 20 minutes. In this intervention, the patient lies on the bed and an audio file plays with relaxing words such as God and love etc. to switch his/her mind to a relaxing space, and simultaneously asks the patient to breathe deeply from the mouth and exhale from the mouth and repeat the words, while relaxing their muscles from the bottom up. This situation lasts for 20 to 30 minutes. The patient was then transferred to the angiography operation ward for angiography.

After performing the angiography, the patient's anxiety level was measured and recorded using the Aaron Beck Anxiety measurement Scale before the patient was informed about the outcome of the angiography. Then, the vital signs (number of pulses, number of respiratory, systolic and diastolic blood pressure and arterial oxygen saturation level) were recorded in both groups on the monitoring device. If the conditions for the patient listed in the exclusion criteria were noted, the patient was excluded from the study and specific treatments were carried out according to the physicians and nurses of the relevant department.

Ethical codes were taken into consideration at all stages of the research. For this purpose, after obtaining a license from the Ethics Committee of the Medical University of Baqiyatallah - al - Azam (Aj) Hospital, volunteers provided an informed consent to participate in the research. Participants were assured of compliance with the principles of privacy in the dissemination of information and the confidentiality of personal information. Individuals were assured that participation in the study did not affect the provision of care.

Data were analyzed using the SPSS version 16 software. In order to homogenize the samples, the Kolmogorov - Smirnov test was used and to compare the anxiety of the two groups before and after the angiography, a nonparametric comparative method (Mann - Whitney) was used, and significant differences (P < 0.05) were considered.

4. Results

The total number of participants in this study was 60. To evaluate the distribution of variables in two test groups, relaxation and control, descriptive indexes of frequency and frequency percentage, mean, and standard deviation were used. The two groups did not differ significantly from the viewpoint of demographic characteristics (Table 1). Quantitative demographic variables, such as age, BMI, etc. were compared by the t test in two test groups, relaxation and control group. Qualitative demographic variables such as gender, marital status, and education were compared with the Chi - square test in the two groups, relaxation and control group (Table 2). In terms of quantitative and qualitative demographic variables, there was no significant difference between the two test groups (P < 0.05). The only difference was the history of hyperlipidemia between the two groups and the Analysis of Covariance (ANCOVA) test showed that this difference had no significant effect on the response variable (P < 0.05) (Table 3).

Table 4 shows the anxiety of the samples in both intervention and control groups before and after angiography. The Mann - Whitney test did not show a significant difference between the two groups before the angiography. The Wilcoxon nonparametric test showed that there was a significant difference between the intervention group and the control group before and after the angiography (P < 0.05). Although greater decrease in anxiety scores in the relaxation group was observed after angiography, Mann - Whitney U statistical test did not show a significant difference between the two groups after the angiography (P > 0.05).

Table 1. The Mean Distribution of Quantitative Demographic Information of Patients under Study in the Two Groups

Parameters	Relaxation Group		Control Group		Independent t - test; t, P Value
	Mean	SD	Mean	SD	
Age, y	53.00	7.12	56.30	9.81	t = 1.09, p = 0.34
BMI, kg/m^2	27.80	4.58	28.60	4.17	t = 0.75, p = 0.47

Table 2. The Frequency Distribution of Qualitative Demographic Information of the Patients under Study in the Two Groups

Parameters	Relaxation Group		Control Group		Chi - 2 test, χ^2, P Value
	N	%	N	%	
Gender (male)	13.00	43.30	18.00	60.00	χ^2 = 6.78, df = 2, P = 0.34
Education (below diploma)	20.00	66.70	16.00	53.30	χ^2 = 5.25, df = 2, P = 0.26
Job (retired)	15.00	51.70	12.00	40.00	χ^2 = 5.45, df = 2, P = 0.45
Marital status (married)	28.00	93.30	26.00	86.70	χ^2 = 7.41, df = 2, P = 0.69

Table 3. The Frequency Distribution of Medical History Data in Patients under Study in the Two Groups

Parameters	Relaxation Group		Control Group		Chi - 2 test, χ^2, P Value
	N	%	N	%	
High blood pressure (yes)	43.3	13	53.3	16	χ^2 = 1.71, df = 2, P = 0.42
Diabetes (yes)	20	6	20	6	χ^2 = 0.13, df = 2, P = 0.93
Hyperlipidemia (yes)	50	15	36.7	11	χ^2 = 5.43, df = 2, P = 0.06
Drug consumption (yes)	46.3	14	53.3	16	χ^2 = 2.52, df = 2, P = 0.28

Table 4. Distribution of Anxiety Scores in Patients under Study in the Two Groups Before and After Angiography

Parameters	Before		After		Wilcoxon Test, Z, P Value
	Mean	SD	Mean	SD	
Relaxation	33.86	9.64	23.53	3.18	Z = - 4.46, P = 0.0001
Control	30.66	11.17	25.33	4.72	Z = - 2.95, P = 0.003

5. Discussion

The present study was designed to investigate the effect of Benson's relaxation on the anxiety of patients under radial angiography. The scores of anxiety of the two groups before angiography was more than 31 (high severe anxiety) and after angiography, this was between 20 and 30 (mean moderate anxiety). The results of this study showed that although there was a reduction in anxiety in the control group, the level of anxiety reduction in the relaxation group was greater than the control group. Comparing the mean difference of anxiety in both groups before and after angiography, confirmed this finding. However, the statistical test did not show a significant statistical difference between the control and intervention groups.

Angiography is the gold standard test for the diagnosis of coronary artery disease; however, more than 82% of patients have anxiety and stress before angiography, which significantly affects the diagnostic test, and it is known to be a disturbing therapeutic agent, while its chronic form can be considered as an exacerbating factor in cardiovascular disease (7).

Poorolajal et al.'s (2017) study entitled "The effect of Benson's relaxation on anxiety and vital signs of patients before surgery" also indicated that the use of Benson's relaxation technique is a safe and non - adverse and, at the same time, beneficial and effective in reducing anxiety and hemodynamic responses in patients undergoing surgery (17).

The study of Tahmasebi et al. (2016), entitled by "The effect of Benson relaxation on anxiety in patients undergoing coronary angiography" showed the effect of Benson relaxation technique in decreasing anxiety level in the studied patients (18). In a study entitled by "effect of reflective massage and Benson relaxation in reducing anxiety in patients undergoing angiography", Torabi et al. (2012) con-

cluded that reflective massage and relaxation are effective in reducing anxiety in patients undergoing angiography (6).

Tahmasebi et al.'s (2015) study was conducted to investigate the effects of aromatherapy and relaxation on physiological and anxiety indices in patients undergoing coronary angiography. The findings of this study showed that there was a significant reduction in anxiety when comparing relaxation and control groups; however, the results did not show a significant difference between the two groups of relaxation aromatherapy after the intervention and showed a statistically significant reduction in the systolic blood pressure, the number of pulses, and the number of respiration variables in each aroma group and relaxation group compared with the control group (1).

Comparison of the results of this study with the above - mentioned studies, suggests that further studies are needed to investigate the effectiveness of relaxation technique on anxiety in patients undergoing radial angiography. Also, studies with a larger sample size can contribute to significant statistical differences.

Benson's relaxation intervention can be effective in reducing the anxiety of patients as candidates for radial angiography and this can be indicative of the benefits of non-pharmacological interventions in reducing anxiety in patients prior to invasive interventions. Nurses, as a member of the therapeutic team are required to determine the patient anxiety level and to reduce the patient's anxiety.

This can be seen in the benefits of non - pharmacological interventions in reducing anxiety in patients prior to aggressive interventions. Nurses, as a member of the therapeutic team, are required to determine the patient's anxiety and to reduce the anxiety of the patients.

The area of the angiography section in terms of x - rays and often inappropriate conditions of the patient's general condition during data collection was amongst the limitations of this study, where it was no longer possible to provide a relaxed and stress - free environment during the relaxation process, and the patient was too tried to maintain stable conditions to do the intervention.

Acknowledgments

Footnotes

References

1. Tahmasebi H, Darvishkhezri H, Abdi H, Abbasi A, Asghari N. The effect of benson relaxation and aromatherapy on anxiety and physiological indicators in patients undergoing coronary angiography. *J Nurs Midwifery Urmia Univ Med Sci*. 2015;**12**(12):1094–103. Persian.
2. Zhang WJ, Yan JC, Wang ZQ. Application of the interventional limb raising management strategy (ILRMS) at radial vascular access sites in coronary angiography and percutaneous coronary intervention: A randomized trial. *Int J Nurs Sci*. 2016;**3**(1):54–7. doi: 10.1016/j.ijnss.2016.02.005.
3. Rajai N, Choopani N, Pishgouyi SAH, Sharififar S. The effect of acupressure on anxiety of patients candidate for coronary angiography. *Mil Caring Sci*. 2015;**2**(1):6–13. doi: 10.18869/acadpub.mcs.2.1.6.
4. Ho HH, Jafary FH, Ong PJ. Radial artery spasm during transradial cardiac catheterization and percutaneous coronary intervention: incidence, predisposing factors, prevention, and management. *Cardiovasc Revasc Med*. 2012;**13**(3):193–5. doi: 10.1016/j.carrev.2011.11.003. [PubMed: 22226169].
5. Satheesh S, Subramanian A. How to do radial coronary angiogram? *Indian Heart J*. 2015;**67**(2):170–4. doi: 10.1016/j.ihj.2015.04.009. [PubMed: 26071302].
6. Torabi M, Salavati M, Ghahri Sarabi AR. Effect of foot reflexology massage and benson relaxation techniques on anxiety and physiological indexes of patients undergoing coronary heart angiography. *Sci J Hamadan Nurs Midwifery Facul*. 2012;**20**(1):63–73.
7. Atik D, Atik C, Karatepe H, Karatepe C, Cinar S. The effect on anxiety level of coronary angiographic result and the perception of pain. *Int J Res Med Sci*. 2015;**3**(2):391. doi: 10.5455/2320-6012.ijrms20150202.
8. Conway A. Anxiety score as a risk factor for radial artery vasospasm during radial interventions: a pilot study. *Angiology*. 2014;**65**(1):71–2. doi: 10.1177/0003319713505896. [PubMed: 24101709].
9. Astarcioglu MA, Sen T, Kilit C, Durmus HI, Gozubuyuk G, Agus HZ, et al. Procedural sedation during transradial coronary angiography to prevent spasm. *Herz*. 2016;**41**(5):435–8. doi: 10.1007/s00059-015-4373-5. [PubMed: 26598418].
10. Ruiz-Salmeron RJ, Mora R, Masotti M, Betriu A. Assessment of the efficacy of phentolamine to prevent radial artery spasm during cardiac catheterization procedures: a randomized study comparing phentolamine vs. verapamil. *Catheter Cardiovasc Interv*. 2005;**66**(2):192–8. doi: 10.1002/ccd.20434. [PubMed: 15977263].
11. Ercan S, Unal A, Altunbas G, Kaya H, Davutoglu V, Yuce M, et al. Anxiety score as a risk factor for radial artery vasospasm during radial interventions: a pilot study. *Angiology*. 2014;**65**(1):67–70. doi: 10.1177/0003319713488931. [PubMed: 23657175].

12. Chen CW, Lin CL, Lin TK, Lin CD. A simple and effective regimen for prevention of radial artery spasm during coronary catheterization. *Cardiology*. 2006;**105**(1):43–7. doi: 10.1159/000089246. [PubMed: 16254422].

13. Arami S, Kazemi M, Esmaeili-Nadimi A. Comparing the effect of acupressure points shenmen (HE7) with a third eye on anxiety in patients undergoing coronary angiography. *Med Surg Nurs J*. 2015;**4**:41–6. Persian.

14. Tahmasebi H, Hasani S. The comparing the effect of aroma inhalation lavendola and benson relaxation on condition of the vital sign patients experiencing coronary angiography. *J Nurs Midwifery Urmia Univ Med Sci*. 2016;**14**(8):682–91. Persian.

15. Hanifie N, Ahmadi F, Memaryan R, Mohamad khani A. Comparison of the effect of Benson relaxation and premedication on the hemodynamic conditions of patients undergoing coronary angiography. *Daneshvar Medical*. 1383;**12**(53):49–57. Persian.

16. Malmir M, Teimouri F, Pishgooie A, Dabaghi P. The Role of Benson´s relaxation on reducing state anxiety on candidate of open heart surgery patient's . *Mil Caring Sci*. 2015;**2**(3):182–90. doi: 10.18869/acadpub.mcs.2.3.182.

17. Poorolajal J, Ashtarani F, Alimohammadi N. Effect of Benson relaxation technique on the preoperative anxiety and hemodynamic status: A single blind randomized clinical trial. *Artery Res*. 2017;**17**:33–8. doi: 10.1016/j.artres.2017.01.002.

18. Tahmasbi H, Hasani S. Effect of Benson's relaxation technique on the anxiety of patients undergoing coronary angiography: A randomized control trial. *J Nurs Midwifery Sci*. 2016;**3**(1):8–14. doi: 10.18869/acadpub.jnms.3.1.8.

19. Steinberg DH. *Managing complications of transradial catheterization. Cardiac Interventions Today*. 2015, [cited April 23]. Available from: https://citoday.com/pdfs/cit0515_F4_Steinberg.pdf.