Original Article

Comparing the Effects of Muscle Relaxation and Music Therapy on Anxiety among Candidates for Coronary Angiography: A Randomized Clinical Trial

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Abstract

Background: Coronary angiography is associated with some levels of anxiety. Anxiety in turn can cause different complications, and hence, interventions are needed for its management. Recently, nonpharmacological therapies for anxiety management have gained great attention. **Objectives:** This study aimed to evaluate the effects of muscle relaxation and music therapy on anxiety among candidates for coronary angiography. **Methods:** This randomized controlled trial was conducted on 105 candidates for coronary angiography. Participants were consecutively recruited from the cardiology wards of Namazi hospital, Shiraz, Iran, and were randomly assigned to three 35-person groups, namely music, relaxation, and control groups. Participants in the music and the relaxation groups received 20-min music therapy and were performed 20-min muscle relaxation. Anxiety level was assessed both before and after the interventions using the Spielberger State Anxiety Inventory. Data were analyzed through the Chi-square test, the paired-sample *t*-test, and the one-way analysis of variance. **Results:** The mean score of anxiety in the relaxation and the music groups significantly reduced from 51.08 ± 6.98 and 49.02 ± 7.74 at the baseline to 41.88 ± 5.16 and 44.28 ± 5.21 at posttest ($P < 0.01$); however, it did not significantly change in the control group ($P = 0.081$). **Conclusion:** Both muscle relaxation and music therapy are effective in significantly reducing anxiety among candidates for angiography.

Keywords: *Angiography, Anxiety, Cardiovascular disease, Music therapy, Relaxation*

Introduction

Cardiovascular disease (CVD) is the leading cause of death worldwide.[1] Estimates show that in 2013, CVD accounted for 30% of all deaths in the world.[2] CVD is also a leading cause of hospitalization among patients over 65.[3] The direct and indirect CVD-related costs in 2010 were about 39.2 billion dollars.[4] CVD is also a leading cause of death in our country, Iran.[5]

Angiography is one of the main diagnostic procedures for CVD.[6] It is estimated that about two million people in the United States and 18,000 people in Iran have so far undergone angiography.[7] Angiography can cause different levels of stress.[4] Stress, in turn, is associated with different adverse effects.[8] Preangiography anxiety can also cause different complications, worsen physical and mental health conditions, and thereby affect the outcomes of angiography. Therefore, interventions are needed to prevent and reduce anxiety among candidates for angiography.[9]

Currently, different pharmacological and nonpharmacological therapies are used for anxiety management.[10] Pharmacological therapies usually cause different side effects, and hence, nonpharmacological therapies have gained great attention in recent years.

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Previous studies reported the positive effects of nonpharmacological therapies such as relaxation, aromatherapy, yoga, massage, music therapy, and laughter.[11-13] Compared with other therapies, relaxation and music therapy are easier to use, and hence, are among the most appropriate therapies for stress management.

Progressive muscle relaxation is one of the nonpharmacological therapies for anxiety management.[14] Relaxation reduces muscle tension by stimulating the parasympathetic system.[15] A study reported that relaxation can reduce anxiety among patients receiving dialysis and patients with osteoarthritis.[16] This technique does not require special equipment, is easy to use, and saves time and money.[17] Music therapy is another therapy for anxiety management.[18] A study reported that listening to a piece of recorded music can help reduce anxiety in different settings and among different patient populations.[19] The low costs and easy applicability of relaxation and music therapy have turned them into the most common nonpharmacological therapies for anxiety management.[20] Several studies found that music therapy can significantly reduce anxiety during cardiac catheterization and coronary angiography.[21-23] Contrarily, a study showed that music therapy was not effective in significantly reducing anxiety among patients with cardiac surgery.[24] Due to the inconsistent results of previous studies into the effects of relaxation and music therapy on anxiety among candidates for angiography, further studies are still needed to produce firmer evidence.

Objectives

This study aimed to evaluate the effects of muscle relaxation and music therapy on anxiety among candidates for coronary angiography.

Methods

Design and participants

This randomized clinical trial was conducted in April 2015. Participants were 105 cardiac patients consecutively recruited from the cardiology wards of Namazi hospital, Shiraz, Iran. Inclusion criteria were an age of eighteen or more, no previous history of coronary angiography and invasive procedures (such as transesophageal echocardiography), absence of valvular heart disease, no acute chest pain, no history of neuropathy or delirium, hearing impairment, or mental disorders, no intake of sleep medications, psychotropic agents, or anxiolytic agents, no drug abuse, and a score of 21 or over for the SAI. Exclusion criteria were alterations in consciousness and deterioration of health conditions during the study. Using an online randomizer option (i.e., www.randomizer.org), participants were randomly assigned to three 35-person groups, namely music, relaxation, and control groups.

The sample size was calculated using the results of a former study which showed that music therapy reduced anxiety among candidates for coronary artery bypass graft surgery from 1.53 ± 0.89 to 0.77 ± 0.72.[25] Accordingly, with a type I error of 0.01, a type II error of 0.1, a μ_1 of 1.53, a μ_2 of 0.77, an S_1 of 0.89, and an S_2 of 0.72, the sample size was determined to be 34 in each of the groups.

Instruments

A demographic questionnaire and the Spielberger State Anxiety Inventory (SAI) were used for the data collection. The inventory contains twenty items scored on a 4-point Likert scale as the following: 4: "Not at all;" 3: "Somewhat;" 2: "Moderately;" and 1: "Very much." Negatively worded items are scored reversely. The lowest and highest possible scores of the inventory are 20 (No anxiety) and 80 (severe anxiety), respectively. Scores of 21–39, 40–59, and 60–80 are interpreted as mild, moderate, and great anxiety. The validity and the reliability of this inventory were confirmed in a former study and its overall Cronbach's alpha was 0.79.[26]

Intervention

One hour before angiography, participants' anxiety level was assessed in a quiet room using the SAI, and then, the study interventions were implemented. For participants in the music group, a piece of instrumental music with a slow, soft relaxing rhythm was played for 20 min via an MP3 player and a headphone.[26] In the relaxation group, muscle relaxation techniques were taught to participants, and then, they exercised them in the prone position for 20 min under the supervision of the first author. Muscle relaxation included the following seven steps. First, each participant was asked to imagine his/her right lower limb (from the toes to the lumbar region) and to contract and relax its muscles. Second, he/she was asked to do the same technique for the left lower limb. Third, he/she was asked to imagine his/her right upper limb (from the fingers to the shoulder) and to slowly close the fingers to make a fist and then slowly unclench the fist to contract and relax hand muscles. Fourth, he/she was asked to do the same technique for the left upper limb. Fifth, he/she was asked to contract and relax the muscles of his/her abdomen, flanks, and back. Sixth, he/she was asked to contract and relax the muscles of his/her chest and shoulders. Seventh, he/she was asked to think of the muscles of his/her face, lips, and forehead and to slowly contract and relax them.

Participants in the control group received no music therapy or relaxation. Anxiety level was reassessed for all participants immediately after the interventions.

Data analysis

Data were analyzed using the SPSS software (v. 16.0, SPSS, Inc, Chicago, IL). Characteristics of the groups were compared using the one-way analysis of variance (ANOVA) and the Chi-square test. Within-group comparisons were made using the paired-sample *t*-test. Moreover, the mean anxiety scores of the three groups were compared using the one-way ANOVA. $P < 0.05$ was considered statistically significant.

Ethical considerations

The study protocol was approved by the Ethics Committee of Yazd University of Medical Sciences, Yazd, Iran (code: IR.SSU.REC.1394.12). The study was also registered in the Iranian Registry of Clinical Trials (code: IRCT2015121111230N2). The study aims were explained to the participants, and they were ensured that their data would remain confidential, their participation would be voluntary, and they could unilaterally withdraw from the study. Written informed consent was obtained from all participants. All other patients' rights were observed according to the latest version of the Helsinki Ethical Declaration.

Results

In total, 105 patients in three 35-person groups participated in the study [Figure 1]. Groups did not differ significantly from each other considering participants' age, gender, marital status, and education level ($P > 0.05$) Table 1.

At baseline, the mean anxiety in all three groups was at moderate level and there was no statistically significant difference among groups considering their mean score of anxiety [$P = 0.152$; Table 2]. After the intervention, the mean score of anxiety significantly decreased in the intervention groups ($P < 0.01$), while it did not significantly change in the control group [$P = 0.081$; Table 2]. Therefore, groups differed significantly considering the posttest mean score of anxiety [$P < 0.001$; Table 2].

Discussion

The results showed that both relaxation and music therapy were effective in reducing anxiety among candidates for angiography, while the effect of relaxation was significantly greater than music therapy. As none of these techniques are associated with serious adverse effects, they can be used instead or in combination

Table 1: Between-group comparisons respecting participants' demographic characteristics

Characteristics	Groups[a]			*P*
	Relaxation (*n*=35)	Music (*n*=35)	Control (*n*=35)	
Gender				
Male	11 (31.4)	13 (37.1)	15 (42.9)	0.613[b]
Female	24 (68.6)	22 (62.9)	20 (57.1)	
Age (years)	48.94 ± 6.56	48.25 ± 6.45	49.68 ± 7.54	0.686[c]
Marital status				
Single	2 (5.7)	5 (14.3)	2 (5.7)	0.335[b]
Married	33 (94.3)	30 (85.7)	33 (94.3)	
Education level				
Illiterate	10 (28.6)	4 (11.4)	4 (11.4)	0.144[b]
Below diploma	8 (22.9)	6 (17.1)	12 (34.3)	
Diploma	13 (37.1)	15 (42.9)	14 (40.0)	
University	4 (11.4)	10 (28.6)	5 (14.3)	

[a]Data presented as *n* (%) or mean ± SD, [b]The results of the Chi-square test, [c]The results of the one-way ANOVA. SD: Standard deviation, ANOVA: Analysis of variance

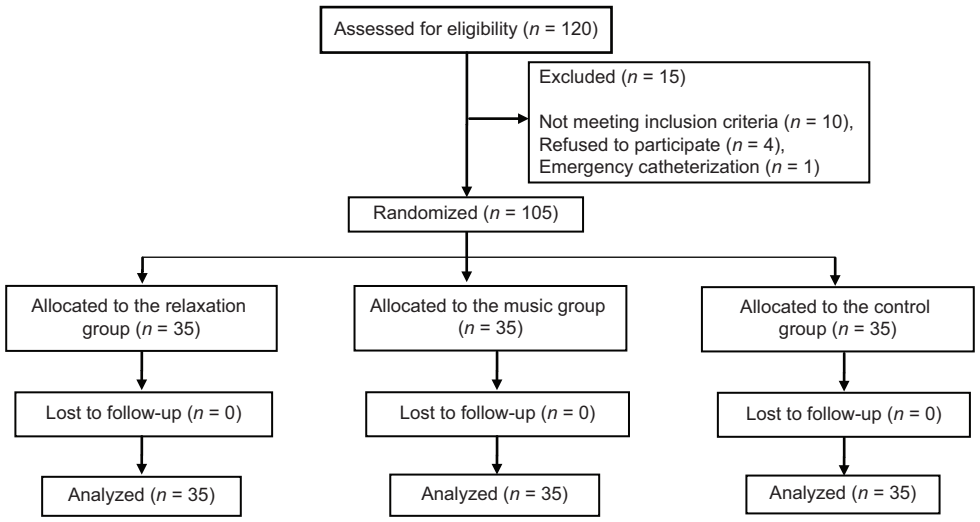

Figure 1: The flow diagram of the study

Table 2: Within- and between-group comparisons respecting the mean score of anxiety

Groups	Time[a]		*P*[b]
	Before	After	
Muscle relaxation	51.08 ± 6.98	41.88 ± 5.16	0.001
Music therapy	49.02 ± 7.74	44.28 ± 5.21	0.004
Control	48.25 ± 6.63	48.45 ± 6.63	0.081
P[c]	0.152	0.001	-

[a]Data are presented as mean ± SD, [b]The results of the paired-sample *t*-test, [c]The results of the one-way ANOVA. SD: Standard deviation, ANOVA: Analysis of variance

with other nonpharmacological therapies for anxiety reduction. Combination of these techniques may result in more anxiety reduction.

We found a significant reduction in anxiety levels in the music group. In agreement with this finding, a previous study reported that music therapy significantly reduced the level of preradiotherapy anxiety.[27] Another study also reported that beautiful music can improve the function of the nervous, cardiovascular, digestive, and endocrine systems and cause psychological improvements.[28] Similarly, a study showed that a single 30-min session of music therapy produced relaxation among patients under mechanical ventilation as manifested by improvements in physiological parameters and resting behaviors.[29] Moreover, a study showed that Quran recitation reduced anxiety, systolic blood pressure, and respiratory rate before the angiography.[30]

The positive effects of music therapy on anxiety levels are probably due to its positive effects on patients' physiological status[31] or alpha brain wave stimulation which triggers the release of endorphins.[32] Moreover, music has significant effects on the right hemisphere of the brain which controls many emotions and behaviors. Thereby, music can help regulate emotions and behaviors. Music also positively affects the physiological function of the body and regulates the release of some beneficial chemicals such as acetylcholine and thereby promotes blood flow and nerve excitability. In contradiction to our findings, a study showed that music therapy had no significant effects on anxiety levels among patients with cardiac surgery.[24] This contradiction may be due to the use of sedative agents before the procedure, the short duration of intervention, small sample size, and patients' concentration on angiography rather than music therapy in that study.

Our findings also indicated that muscle relaxation significantly reduced anxiety. In line with our findings, several studies showed the positive effects of different relaxation techniques on anxiety among patients with cardiac catheterization,[33,34] situational anxiety and respiratory rate among patients with myocardial infarction,[35] preangiography anxiety among cardiac patients,[27] norepinephrine level, shortness of breath, blood pressure, heart rate, and body temperature among patients undergoing cardiac surgery,[36] and anxiety and different aspects of quality of life (including physical activity, physical role limitation, bodily pain, general health, vitality, social functioning, mental health, and mental role limitations) after coronary artery bypass graft surgery.[37] Moreover, a study showed the positive effects of progressive muscle relaxation on blood pressure and dialysis adequacy among patients who received hemodialysis.[38] As a simple and inexpensive nonpharmacological therapy, muscle relaxation plays a significant role in symptom management among cardiac patients, helps them better cope with stressful situations, and facilitates the process of treatment.[39]

The greatest strength of this study was its randomized controlled trial. The study also had some limitations. First, the effects of the interventions might have been affected by routine pharmacological therapies used for symptom management, environmental factors, participants' individual differences, and their attitudes and beliefs about music and relaxation. Second, the length of both interventions was rather short. Third, the sample size was calculated based on a study on patients with myocardial infarction, who are different from candidates for an invasive procedure. Fourth, the study sample was rather small. Further studies on larger samples of patients are needed to determine the effects of relaxation and music therapy adjusted for the effects of environmental factors.

Conclusion

This study concludes that both muscle relaxation and music therapy are effective in significantly reducing anxiety among candidates for coronary angiography. Therefore, these complementary techniques can be used by nurses to provide mental support to this group of patients. The patients might also be taught to start the anxiolytic methods at home and then continue it before angiography while they are in hospital.

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Conflicts of interest

There are no conflicts of interest.

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