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Effect of aromatherapy on anxiety in patients with acute coronary syndrome hospitalized in cardiac care unit

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ABSTRACT

Anxiety is one of the main causes of heart attacks in patients hospitalized for heart disease. There are different ways to reduced anxiety. Aromatherapy is one of the methods used to reduce anxiety. This study determines the effects of aromatherapy on anxiety of patients with ACS hospitalized in a cardiac care unit. This clinical trial was conducted in 2016 on 60 patients diagnosed with ACS and hospitalized in CCU of 22 Bahman Hospital, Gonabad. Patients were recruited by convenient sampling and assigned randomly to control and experiment groups. The experiment group received aromatherapy with a combination of essential oils of lavender, Matricaria recutita, and neroli (6:2:0.5) three consecutive nights; the control group received no intervention. Data were analyzed by using SPSS20, independent *t*-tests, chi-square test, and exact Fisher test ($p < 0.05$). Each group contained 30 participants who were not significantly different in terms of underlying characteristics ($p > 0.05$). There was a significant difference in the mean score of anxiety post- ($p < 0.04$) and pre-intervention ($p < 0.001$). The post- and pre-intervention scores were significant between the two groups ($p < 0.001$). The mean score of anxiety increased in the control group and decreased in the experiment group. Thus, it was concluded that aromatherapy is a cost-effective and uncomplicated method that can reduce anxiety of patients with ACS hospitalized in the CCU.

Keywords: aromatherapy, anxiety, acute coronary syndrome
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INTRODUCTION

Cardiovascular diseases are chronic diseases that not only account for a high number of deaths but also enforce severe limitations in the quality of one's life over time.[1] Currently, cardiovascular diseases are the most common cause of death in the world. At the beginning of the 20th century, these disorders were responsible for less than 10% of all deaths worldwide. Currently, cardiovascular diseases account for nearly 30% of deaths across the world; this rate is close to 40% in high-income countries and 28% in low- to average-income countries.[2] Although age between 30-80 years old of death from cardiovascular diseases decreased by 39%<, it increased by 41% in 1990–2013.[3] More than any other disease, ischemic heart diseases cause mortality and disability in developed countries and impose economic costs. Ischemic heart diseases are the most common, most serious, most chronic, and most dangerous diseases in the United States where 13 million people suffer from these diseases. More than 6 million people suffer from angina, and more than 7 million have had a myocardial infarction. High-fat and high-energy diet, smoking, and a sedentary lifestyle are associated with the prevalence of cardiovascular diseases.[2] In Iran, the incidence of cardiovascular diseases is high, accounting for 90,000 deaths annually. According to available statistics, 46% of deaths are caused by cardiovascular diseases. According to the Ministry of Health and Medical Education, about 39% of all patients referred to health-care centers suffer from cardiovascular diseases.[4] Acute coronary syndrome (ACS) is an emergency condition characterized by acute and sudden myocardial ischemia that can lead to myocardial infarction (MI) if not treated. ACS is a spectrum of conditions that include unstable angina, non-St-segment elevation MI (NSTEMI), and St-segment elevation MI (STEMI). Chest pain that occurs suddenly and persists despite rest and medication is the symptom appearing in most patients with ACS. Patients may experience a combination of symptoms, including chest pain, shortness of breath, indigestion, nausea, and anxiety. These signs and symptoms which are caused by stimulation of sympathetic nervous system may be short-term or persistent.[5] Patients with ACS experience different degrees of anxiety during hospitalization. About 50% of these patients report symptoms of anxiety, which can be due to hospitalization, fear of death, fear of another stroke, and overall fear of unknown.[6] This leads to the release of catecholamines and physiological responses such as hypertension, heart rate, increased respiratory rate, and shortness of breath, resulting in the development of myocardial ischemia.[7] Severe diseases, regardless of their cause, expose the patients to psychological and physiological complications. When providing care

to critically ill patients, the focus is on the prevention of complications related to the disease, including mental health problems such as hallucinations, depression, anxiety, and disturbed sleep.[8] One of the treatments that have grown substantially in recent years is aromatherapy. This treatment is widely used as the second complementary intervention in clinical practice.[9] One of the fragrances highly used as a sedative is lavender (Lavandula angustifolia from the family Labiatae); effective ingredients of lavender include linalool and linalyl acetate; linalool acts as a sedative by influencing gamma-aminobutyric acid receptors in the central nervous system,[10] whereas linalyl acetate provides a narcotic effect.[11] Lavender can be used as an average sedative to eliminate sleep disorders. Moreover, lavender is an anti-anxiety and bile-inducing aroma. New studies have reported its anti-diabetes properties.[12] Another fragrance is neroli; in traditional medicine of Iran, neroli is known as a sedative and sleep booster. A study on the effect of aromatherapy with neroli essential oil on quality of sleep in patients hospitalized in the cardiology ward showed that although this treatment could improve all aspects of hospital sleep, it can be specifically considered as a new treatment for patients with sleep disorders given its positive effect on the quality and the depth of sleep.[13] Matricaria recutita is another plant used in traditional medicine to help promote quality sleep and better relaxation. Traditionally, Matricaria recutita has been used in different parts of Iran due to its fever-lowering effects, effects on nervous and immune systems, sleep, sedation, and analgesia.[14] Anxiety relief and fear reduction are important nursing practices to reduce sympathetic stress reaction. Reduction in sympathetic stimulation reduces heart workload; this improves pain and other symptoms of ischemia. It is important to establish an honest and caring relationship with patients to reduce their anxiety.[8]

LITERATURE REVIEW

Mi-Yeon Cho et al.[15] performed a clinical trial to evaluate the effects of aromatherapy on anxiety, vital signs, and sleep quality in 56 patients undergoing percutaneous coronary interventions (PCI) in intensive care units (ICU). Patients were assigned in equal numbers to two groups, one receiving aromatherapy and another routine nursing care. Aromatherapy was performed with a combination of lavender, Roman Chamomile, and neroli essential oils (6:2:05, respectively) in the form of 10 deep breaths before and after PCI and aromatic stone under the pillow of the patient until the next morning. Finally, anxiety, sleep quality, and blood pressure were measured. A significant reduction in anxiety and improvement in sleep quality was observed in the aromatherapy group compared to routine nursing care group. Systolic blood pressure was not significantly different in both groups. Findings showed that aromatherapy was effective in reducing anxiety and increasing quality of sleep in patients undergoing PCI and in ICU. Aromatherapy may be used as a nursing intervention to reduce anxiety and improve sleep quality.[12] Through a clinical trial, Babashahi et al.[16] evaluated the effect of inhalation aromatherapy on the preoperative anxiety of 72 patients who were candidates for heart and abdominal surgery. By convenient purposive sampling, subjects were recruited based on inclusion criteria and assigned randomly to case and control groups. The State-Trait Anxiety Inventory (STAI) was used to evaluate anxiety. The intervention included inhalation of a paper tissue containing two drops of lavendula oil which were prepared by a pharmacist for 20 minutes. The same amount of placebo (water) was used for the control group. The results showed that aromatherapy was effective in reduction of preoperative anxiety. Aromatherapy can be used as a complementary medicine therapy in clinical practice. Tahmasbi et al.[17] performed a clinical trial to evaluate the effect of aromatherapy on the anxiety levels of 96 patients hospitalized for coronary angiography. An equal number of patients were assigned to control and experiment groups. Both groups completed a questionnaire containing demographic variables and vital signs and STAI before and after aromatherapy. The intervention included inhalation of a paper tissue containing two drops of lavender oil for 3 minutes. The same amount of water (placebo) was used for the control group. Vital signs were recorded 30 minutes after intervention and STAI were filled by a nurse. The results showed that inhalation of lavender oil before angiography could reduce the anxiety of patients. Heidari et al.[9] performed a clinical trial to evaluate the effect of lavender oil inhalation on anxiety and some physiologic parameters of 90 patients divided into control and intervention groups who were candidates for open heart surgery. The intervention group inhaled two drops of lavender oil, and the control group inhaled two drops of distilled water poured on a bandage for 20 minutes. Before and after the intervention, STAI was filled out by the patients; their vital signs were also recorded. Results showed that aromatherapy with lavender reduced anxiety. Through a clinical trial, Kanany et al.[18] examined the effect of aromatherapy with lavender essential oil on the anxiety levels of 65 patients undergoing hemodialysis; the patients were randomly assigned to two groups. In addition to routine care, the experiment group was administered lavender inhalation; the patients inhaled from a paper tissue containing one drop of lavender oil for 15–20 min, 3 times of a week for 4 weeks. The control group received routine care. In both groups, state and trait anxieties were measured by STAI and recorded. Results showed that lavender oil inhalation reduced state and trait anxiety of hemodialysis patients.

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Hypotheses

- Aromatherapy is effective in reducing state anxiety of ACS patients hospitalized in CCUs.
- Aromatherapy is effective in reducing trait anxiety of ACS patients hospitalized in CCUs.
- Aromatherapy is effective in reducing the anxiety of ACS patients hospitalized in CCUs.

MATERIALS AND METHODS

This study was a controlled clinical trial using random, parallel, and single-blind methodology. Using convenient sampling, patients were recruited by considering and controlling variables and the intended parameters; then, the patients were randomly assigned to experiment and control groups. The experiment group was examined to determine the effect of aromatherapy on ACS patients hospitalized in coronary ICUs. The population studied included patients diagnosed with ACS and hospitalized in CCU of 22 Bahman Hospital, Gonabad. The subjects included 60 patients who were diagnosed with ACS, referred to the hospital for treatment, and willing to participate in the study. Considering data obtained from a similar study, the sample size was estimated at 28 subjects for each group using mean comparison formula at 95% confidence interval and 90% testability. By considering the likelihood of 10% sample loss, 30 subjects were selected for each group; totally, 60 subjects were recruited for the study. Instruments and materials used for data collection included: (a) information from including demographic and underlying data such as age, gender, occupation, marital status, education, number of family members, frequency of hospitalization, known underlying diseases, administration of sedation medications, level of daily activities, and smoking, and (b) STAI. Once the project was approved by the Regional Ethics Committee, Gonabad University of Medical Science (IR.GMU.REC.1394.61), and submitted to the Iran Clinical Trial Center (IRCT2015122922682N4), the qualified subjects were recruited. Written informed consent was obtained from the subjects. Samples were randomly assigned to experiment and control groups using permutation blocks (15 permuted blocks of four) and random numbers table. Six possible cases (AABB, ABAB, BBAA, BABA, ABBA, BAAB) were listed. The number of blocks required was determined by using random numbers table, based on which subjects were assigned to the experiment group (B) and control group (A). The author introduced himself and explained the objectives to patients. Written informed consent was obtained from the patients. The patients were asked to fill demographic data questionnaire and STAI. Records of the patients were completed; the initial assessment was done. Subjects were randomly assigned to experiment and control groups. Intervention (aromatherapy) was done for the experiment group. The control group received no intervention and received only routine cares. The experiment group received usual drugs; then they were exposed to a combination of lavender, Matricaria recutita, and neroli essential oils (6:2:0.5) for three consecutive nights at 21:00 p.m. The patients or their relatives were asked to pour two drops of a mixture of essential oils (Giah-Essence Agro-industry and Pharmaceutical Company, Gorgan) on a cotton ball using a dropper. The cotton ball was then held under the patient's nose. The patient closed his eyes and took 10 deep breaths. Then, the cotton was pinned to the collar of the patient. The patient unpinned the cotton once he woke up and disposed it. The author showed to patients how and where they should pin the cotton. The control group did not receive any intervention during the study. In the morning of the fourth day, once the patients woke up and informed of their tendency, STAI questionnaire was read out for the patients and patients filled in the questionnaire once again. Data were analyzed by SPSS[20] ($p < 0.05$). Chi-square test was used to compare qualitative variables, including gender, income, education, occupation, residence, hospitalization history, underlying disease, and history of sedation medications in both groups. Since chi-square test could not be used to compare two qualitative variables (opioids and marital status) between the two groups, exact Fisher's test was used to compare the variables. Independent *t*-test was used to compare the means of quantitative variables including age, weight, and height between the two groups. Independent *t*-test was used to compare the quantitative variables of anxiety in both groups.

Table 1 Comparison of age, weight, and height of the subjects in both groups

Age	N	Mean ± SD	t-test
Control	30	58.90 ± 10.73	t =1.65
Experiment	30	54.33 ± 10.72	df = 58 p = 0.1
Weight (kg)	**N**		
Control	30	69.30 ± 13.44	t = 0.25
Experiment	30	68.53 ± 10.07	df = 58 p = 0.80
Height	**N**		
Control	30	172.07 ± 7.50	t = 1.41
Experiment	30	169.57 ± 6.17	df = 58 p = 0.16

RESULTS

General Characteristics

As shown in Table 1, there was no significant difference in the age of the subjects between the

Table 2 **Comparison of gender, income, occupation, residence, hospitalization, opioids, underlying disease in the subjects of both groups**

Gender	Control *N* (%)	Experiment *N* (%)	Result
Male	25 (83.3)	20 (66.7)	$c^2 = 2.22$
Female	5 (16.7)	10 (33.3)	$df = 1$
Total	30 (100)	30 (100)	$p = 0.14$
Income			
<10 million Rials	23 (76.7)	19 (63.3)	$c^2 = 1.27$
10–20 million Rials	7 (23.3)	11 (36.7)	$df = 1$
Total	30 (100)	30 (100)	$p = 0.26$
Occupation			
Employee	9 (30.0)	11 (36.7)	$c^2 = 1.82$
Self-employed	16 (53.3)	11 (36.7)	$df = 2$
Unemployed	5 (16.7)	8 (26.7)	$p = 0.40$
Total	30 (100)	30 (100)	
Residence			
Urban	18 (60.0)	20 (66.7)	$c^2 = 0.29$
Rural	12 (40.0)	10 (33.3)	$df = 1$
Total	30 (100)	30 (100)	$p = 0.59$
Hospitalization history			
No	13 (43.3)	18 (60.0)	$c^2 = 1.67$
Yes	17 (56.7)	12 (40.0)	$df = 1$
Total	30 (100)	30 (100)	$p = 0.20$
Underlying disease			
No	13 (43.3)	14 (46.7)	$c^2 = 0.07$
Yes	17 (56.7)	16 (53.3)	$df = 1$
Total	30 (100)	30 (100)	$p = 0.79$
Sedation medications			
No	10 (33.3)	13 (43.3)	$c^2 = 0.63$
Yes	20 (66.7)	17 (56.7)	$df = 1$
Total	30 (100)	30 (100)	$p = 0.43$
Opioids			
Yes	5 (16.7)	4 (13.3)	Fisher's exact test:
No	25 (83.3)	26 (86.7)	$p = 1$
Total	30 (100)	30 (100)	
Marital status			
Single	1 (3.3)	1 (3.3)	Fisher's exact test:
Married	29 (96.7)	29 (96.7)	$p = 1$
Total	30 (100)	30 (100)	

two groups and these groups were homogeneous ($p = 0.1$); there was no significant difference between the two groups in relation to weight ($p = 0.080$) and height ($p = 0.16$) of the subjects.

As shown in Table 2, there was a significant difference in gender between the two groups ($p = 0.14$). As shown in the table, there was no significant difference in income between the two groups ($p = 0.26$). The results of chi-square test showed there was no significant difference between the two groups either in the occupation ($p = 0.40$) or in the residence ($p = 0.59$) of the subjects. Moreover, there was no significant difference in a range of key characteristics between the two groups, particularly in relation to subjects' hospitalization history ($p = 0.20$), underlying diseases ($p = 0.79$), sedation medications ($p = 0.43$), and opioids consumption ($p = 1$), or marital status ($p = 1$). Thus, these groups were considered homogeneous.

Hypothesis Testing

As shown in Table 3, there was no significant difference in the mean score of anxiety before intervention between the two groups ($p < 0.08$); however, a significant difference was found after intervention ($p < 0.001$). There was also a significant difference in scores before and after intervention between the two groups ($p < 0.001$). The mean score of state anxiety increased in the control group and decreased in the experiment group. As shown in Table 3, there was no significant difference in the mean score of trait anxiety before intervention between the two groups ($p < 0.054$), but a significant difference was observed after intervention ($p = 0.001$). There was a significant difference in scores, before and after intervention between the two groups ($p < 0.001$). Mean score of trait anxiety decreased more in the control group than in the experiment group.

According to above table, the mean score of anxiety was significantly different before ($p < 0.04$) and after ($p < 0.0001$) intervention between the two groups. The difference between pre- and post-intervention scores was also significantly different between the two groups ($p < 0.001$). The mean score of anxiety increased in the control group but decreased in the experiment group.

CONCLUSION

The results showed that aromatherapy significantly reduced state anxiety in ACS patients hospitalized in CCU and patients who did not receive aromatherapy experienced an increase in state anxiety. Trait anxiety decreased in both groups of patients, that is, the treated group and the control group; however, this reduction was significantly higher in patients who received aromatherapy. In general, anxiety decreased in patients who received aromatherapy, and anxiety increased in those who did not receive aromatherapy. Different studies have supported the effect of aromatherapy in reducing anxiety. Heidari et al.[9] showed that aromatherapy with lavender essential oil reduced state anxiety

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Table 3 Comparison of mean score of state anxiety before and after intervention between the two groups

Phase	Anxiety	Control Mean ± *SD*	Experiment Mean ± *SD*	*t*-test
Before intervention	State	43.80 ± 7.44	47.47 ± 8.44	$t = -1.78$, $df = 58$, $p = 0.08$
	Trait	43.60 ± 7.23	47.7 ± 6.73	$t = -1.97$, $df = 58$, $p = 0.054$
	Total	87.40 ± 13.83	94.53 ± 12.83	$t = -2.07$, $df = 58$, $p = 0.04$
After intervention	State	45.33 ± 6.98	36.90 ± 5.73	$t = 5.11$, $df = 58$, $p < 0.001$
	Trait	43.30 ± 7.21	37.27 ± 6.76	$t = 3.34$, $df = 58$, $p = 0.001$
	Total	88.63 ± 13.84	74.17 ± 12.13	$t = 4.31$, $df = 58$, $p < 0.001$
Difference between the before- and after-intervention phases	State	1.53 ± 6.63	−10.57 ± 9.11	$t = -5.88$, $df = 58$, $p < 0.001$
	Trait	−0.30 ± 4.43	−9.80 ± 6.21	$t = -6.82$, $df = 53$, $p < 0.001$
	Total	1.23 ± 9.28	−2.37 ± 13.82	$t = -7.11$, $df = 58$, $p < 0.001$

in patients who were candidates for open heart surgery; however, this reduction in state anxiety was also observed in patients who did not receive aromatherapy, though this reduction was higher in patients who received aromatherapy. These findings are consistent with the current study's results for patients who received aromatherapy but not for those who did not receive aromatherapy.[19] This difference can be attributed to the duration of the intervention. In this regard, Babashahi et al.[16] showed that lavender aromatherapy was effective in reducing preoperative anxiety. Mirzaei et al.[20] showed that anxiety was reduced by inhaling lavender essence in childbirth in nulliparous women. Tahmasbi et al.[17] found that lavender aromatherapy reduced anxiety in patients who are scheduled to go through angiography. Cho[15] also reported that the rate of anxiety reduction was higher in the aromatherapy group than in the placebo or control groups. Kanany et al.[18] also evaluated the effect of lavender aromatherapy on the anxiety of patients treated with hemodialysis; they showed that state anxiety significantly decreased in patients who inhaled lavender essence. The findings in all these studies which were conducted to assess the effect of aromatherapy on the anxiety of patients support the findings of the current study and indicate the positive effect of aromatherapy in reducing the anxiety of patients in different situations. Although the exact mechanism of effectiveness of aromatherapy on anxiety is not known yet, it is scientifically believed that aromatherapy can be effective psychologically and physiologically. It is believed that scents from essential oils activate olfactory nerve cells, resulting in stimulation of limbic system. Depending on the type of aroma, nerve cells release different neurotransmitters. These neurotransmitters include enkephalin, endorphin, noradrenaline, and serotonin. Considering the relationship between sense of smell and human feelings, aromas can influence humans both psychologically and physically. In fact, aromas are able to change emotions in human.[21] In general, aromatherapy reduces anxiety of ACS patients hospitalized in CCUs. These findings are clinically important in nursing cares because improvement of these parameters without drugs is an important goal in care providing as doing so can reduce complications arising from regular medicinal or therapeutic interventions. Considering the important role of aromatherapy in reducing the anxiety of these patients as well as the high prevalence of this disease in all societies, administration of this inexpensive and simple nursing intervention can be an effective step in reducing the anxiety of patients and provide an opportunity for treatment team, particularly nurses, to provide better care. To reduce anxiety in cardiac patients, it is suggested that aromatherapy is performed by combining other aromas such as Melissa officinalis, valerian, oregano, and geranium which are sedative and anti-anxiety in nature.

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