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Original Article

Effects of Lavender Oil Inhalation on Anxiety and Pain in Patients Undergoing Coronary Angiography

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ABSTRACT

Background: Cardiovascular diseases alone account for 48% of deaths in the world. There is a high rate of coronary angiography for the early diagnosis of such diseases. Not only do patients suffer from anxiety because of the invasive nature of this procedure but also they experience pain and discomfort for several hours after the procedure. We conducted this study to assess the effects of the inhalation of lavender essential oil on anxiety and pain in patients undergoing coronary angiography.

Methods: This clinical trial was performed at Rajaie Cardiovascular, Medical, and Research Center, Tehran, Iran. Eighty patients who were hospitalized for coronary angiography participated in this study. The patients were divided into 2 groups: control (n = 40) and intervention (n=40). Data collection tools included the 3 forms of demographic information, standard Spielberger questionnaire, and visual analog pain scale, which were completed by both groups before and after aromatherapy with lavender oil. The collected data were analyzed with SPSS software, version 16.0. (Armonk, NY, USA) using the χ^2, McNemar, Wilcoxon, Mann–Whitney, and *t* tests.

Results: The 2 groups were comparable apropos age, sex, marital status, and education level. After aromatherapy, the level of anxiety in the intervention group decreased significantly ($P < 0.05$) in comparison with the control group. Additionally, the extent of pain in the 2 groups showed a significant difference ($P < 0.05$).

Conclusions: Smelling the scent of lavender significantly reduced anxiety and pain in our patients, before and after coronary angiography. ***(Iranian Heart Journal 2017; 18(1):44-50)***

Keywords: Lavender, Anxiety, Pain, Coronary angiography

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Today, the prevalence of cardiovascular diseases has increased as a consequence of changes in lifestyle, advances in technology, alterations in eating habits, smoking, aging, high blood pressure, and lipid levels, all of which in turn lead to diabetes. [1] Cardiovascular diseases are the most important cause of mortality in the world. [2] Given the life-threatening characteristics of this disease and its progressive course, it is necessary to use diagnostic procedures such as angiography. Despite its invasive nature, angiography is the gold standard and an important diagnostic procedure to determine the location and severity of blood flow blockage in coronary arteries. [3] Most of the invasive diagnostic tests are accompanied by anxiety for patients. Alongside diagnostic tests, hospitalization creates different levels of anxiety for patients. Patients' non-acquaintance with the coronary angiography procedure is one of the most common causes of anxiety in these patients. This lack of information leads to the overstimulation of their nervous system. [4] A previous study showed that 82 patients who underwent coronary angiography had experienced anxiety before the procedure. [5] In order to prevent trauma to the arteries after angiography, which may be caused by the patients' leg movement, an absolute bed rest is required. It is recommended to use sand bags weighing 2.5–4 kg around the procedure area. As a consequence, back pain is common among patients after coronary angiography and it is usually accompanied by immobility and limitation of movement. [6] According to a study conducted in Iran, the incidence rate of back pain in patients after coronary angiography was 71.8%. [7] Both pharmacological and non-pharmacological methods have been used to reduce anxiety. Among the non-pharmacological methods, complementary therapies such as aromatherapy have the benefits of being inexpensive, noninvasive, easy to implement, non-pharmacological in nature, and free from chemical adverse effects. [8]

Lavandula angustifolia Mill (lavender), which is called ostokhodos in Iran, is a strong aromatic agent. [9] This plant belongs to the *Lamiaceae* family and is herbaceous, aromatic, and evergreen. Lavender plants are widely used in Iranian traditional medicine. They possess sedative and analgesic effects, confirmed by Iranian scientists such as Abu Ali Sina (Avicenna) and Razi (Rhazes). [10] We conducted the present study to evaluate the effects of lavender oil inhalation on anxiety and pain in patients undergoing coronary angiography.

METHODS

This randomized double-blinded clinical trial was performed at Rajaie Cardiovascular, Medical, and Research Center, Tehran, Iran. All patients who were admitted between August 2014 and April 2015 for coronary angiography were enrolled in this study. Eighty patients were eligible for this study after meeting the inclusion criteria, comprising age between 25 and 75 years, coronary angiography for the 1st time, complete consciousness, no history of taking psychiatric drugs, no history of pulmonary or liver insufficiency, allergies, and asthma. All the patients filled out a written consent form to participate in this study. The patients were enrolled in the study according to the table of a computerized randomization list: control (n = 40) and intervention (n = 40). The data encompassed demographic information, Spielberger standard questionnaire to measure anxiety, and visual analogue pain scale. The data were collected by a trained nurse, who was blinded to the study. The Spielberger questionnaire test consists of 2 separate parts, both parts containing 20 items. The 1st and 2nd parts determine state and trait anxiety, respectively. The feeling of anxiety at the moment is called state anxiety, whereas overall feeling of anxiety during a period is referred to as trait anxiety. The total scores of both state and trait anxiety scales are in the range of 20–80. Patients with total scores > 43

are considered anxious. This questionnaire is widely used by psychologists and psychiatrists. The validity and reliability of its Farsi translation were reviewed and approved by Shahid Beheshti University and Tehran Psychiatric Institute. [8] The Spielberger questionnaires were completed for all the patients 1 hour before angiography. Before the procedure, the patients in the intervention group smelled a piece of cotton wool soaked in 5 drops of lavender essential oil, at a distance of 5 cm from the nose with deep inhalations for 5 minutes. The control group smelled a piece of cotton wool soaked in distilled water in the same manner. The physician and the nurse were blinded to the contents of the vials. Thirty minutes later, the Spielberger questionnaires were completed again. Thereafter, all the patients underwent coronary angiography. One hour after the procedure, pain was measured in all the patients using the visual analogue pain scale. The interventions were subsequently performed on the patients again. Thirty minutes later, pain scoring was assessed using the visual analogue pain scale in all the patients. During the study period, none of the patients met the exclusion criteria, including refusing to give consent to continue the study, having any symptoms of myocardial infarction, and allergy.

RESULTS

The collected data were analyzed using IBM SPSS Statistics for Windows, version 16.0 (Armonk, NY, USA). The χ^2 test revealed no significant differences between the 2 groups in terms of age, sex, marital status, and education level. State and trait anxiety levels in the patients are depicted in Table 2 and Table 3.

Table 1. Review of the homogeneity of the demographic characteristics

Demographic Characteristics				***P***
Sex				0.11
Intervention Group Number (%)		**Control Group Number (%)**		
Male	Female	Male	Female	
14 (35)	26 (65)	22 (55)	18 (45)	
Marital Status				0.09
Intervention Group Number (%)		**Control Group Number (%)**		
Single	Married	Single	Married	
35 (87.5)	5 (12.5)	28 (70)	12 (30)	
Education Level		**Intervention Group Number (%)**	**Control Group Number (%)**	0.87
Less than diploma		21(52.5)	20 (50)	
High school diploma		9 (22.5)	11 (27.5)	
University degree		10 (25)	9 (22.5)	
Age				0.31
Intervention Group Mean		**Control Group Mean**		
50.48		51.30		

Table 2. State and trait anxiety of the control group before and after the inhalation of distilled water

State Anxiety in the Control Group								***P***
Before Intervention				**After Intervention**				0.68
Anxious		**Non-Anxious**		**Anxious**		**Non-Anxious**		
Frequency	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**	
28	70	12	30	26	65	14	35	
Trait Anxiety in the Control Group								0.68
Before Intervention				**After Intervention**				
Anxious		**Non-Anxious**		**Anxious**		**Non-Anxious**		
Frequency	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**	
28	70	12	30	26	65	14	35	

Table 3. State and trait anxiety of the intervention group before and after the inhalation of lavender essential oil

State Anxiety in the Intervention Group								P
Before Intervention				After Intervention				0.001
Anxious		Non-Anxious		Anxious		Non-Anxious		
Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
30	75	10	25	8	20	32	80	
Trait Anxiety in the Intervention Group								0.001
Before Intervention				After Intervention				
Anxious		Non-Anxious		Anxious		Non-Anxious		
Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
27	67.5	13	32.5	14	35	26	65	

Feeling of pain was reduced dramatically in the intervention cases (Table 4).

Table 4. Pain assessment in the participants before and after the inhalation of lavender oil or distilled water

Control Group				P
Before Intervention		After Intervention		
Pain Intensity	Percent in Group	Pain Intensity	Percent in Group	
Mild	30	Mild	30	0.96
Moderate	30	Moderate	33	
Severe	40	Severe	37	
Total	100	Total	100	
Intervention Group				*P-Value*
Before Intervention		After Intervention		
Pain Intensity	Percent in Group	Pain Intensity	Percent in Group	
Mild	30	Mild	55	0.001
Moderate	30	Moderate	42.5	
Severe	40	Severe	2.5	
Total	100	Total	100	

DISCUSSION

Coronary angiography is an invasive procedure that creates pain and anxiety for patients.[11] Hospitalization and waiting for the procedure are the main causes of anxiety in these patients. Healthcare professionals should identify patients' anxiety and try to prevent or relieve it. [12] Both pharmacological and non-pharmacological methods are usually drawn upon to reduce anxiety. In the current study, the effects of lavender oil were assessed on the perception of anxiety and pain in patients candidated for coronary angiography. The results showed that smelling lavender essential oil reduced anxiety and pain before and after coronary angiography. Based on the results, 70%–75% of our patients experienced state anxiety before coronary angiography, which is compatible with previous studies. [3, 13]

We also found a reduction in the state and trait anxiety levels after aromatherapy in the intervention group. Mirzaei et al [14] showed that lavender aromatherapy was able to decrease anxiety and plasma concentrations of cortisol in nulliparous women during labor. Shiina et al [15] reported the relaxation effects of lavender aromatherapy on improving coronary artery blood flow in their study. Elsewhere, Muzzarelli et al [16] concluded that there was a statistically significant difference in anxiety before and after aromatherapy in their intervention group. Based on another study by Karadag et al, [17] lavender essential oil aromatherapy improved sleep quality and decreased anxiety of patients who were hospitalized in the coronary care unit. The results of a study by Kim et al [18] revealed

decreased opioid requirements of patients after laparoscopic adjustable gastric banding (LAGB) as a consequence of postoperative lavender aromatherapy. Likewise, Karaman et al [19] showed that aromatherapy with lavender essential oil had a significant effect on reducing anxiety and pain associated with peripheral venous cannulation in patients undergoing surgery. In a study by Hasanzadeh et al, [20] 24 hours after coronary artery bypass grafting, the patients' perception of pain and anxiety during chest tube removal decreased dramatically as a result of lavender oil aromatherapy. In light of these studies and the results of the present one, it can be concluded that by stimulating the olfactory tract, lavender scent affects the hypothalamus and leads to a decrease in corticotropin releasing hormone. As a result, the pituitary gland secrets less adrenocorticotropic hormone, which can cause a reduction in the cortisol level. [21]

Lavender contains linalool, ketone, and alcohol. Ketones reduce pain and inflammation effectively and have soporific effects. [22] Ericksen [23] also stated that lavender as cold compress on the forehead had anti-fatigue and refreshing effects.

The analgesic properties of lavender essential oil can be attributed to the fact that it can stimulate the olfactory bulb and, thus, confer relaxation. [9] All the results from the aforementioned studies are in accordance with the results of the present study. The analgesic mechanism of this essential oil is not fully understood. However, inhaling 1,8-cineol, which is one of the ingredients of lavender essential oil, can block the production of pain mediators such as prostaglandins and leukotrienes via inhibiting arachidonic acid metabolism. [24]

CONCLUSIONS

Overall, the results of the current study indicated that most of the patients suffered from high levels of anxiety before coronary angiography. Accordingly, in order to prevent this undesirable feeling and its adverse complications, aromatherapy can be used as complementary therapy to reduce the anxiety and improve vital signs of patients before undergoing coronary angiography. Given the advantages of lavender essential oil aromatherapy as a simple, inexpensive, safe, and noninvasive method, it is recommended that this drug-free approach be used to reduce anxiety in patients before invasive diagnostic procedures.

Limitations

The major limitation of the present investigation is that it was a single-center study. Needless to say, multicenter studies with more patients will yield more powerful results.

Conflict of Interest: All the authors of the present study confirm that they have no conflict of interests to disclose regarding the publication of the manuscript or an institution or product that is mentioned in the manuscript and/or is important to the outcome of the study presented.

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