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Original Article

Evaluation of Lavender Oil Inhalation Effects on Blood Pressure and Heart Rate in Patients Undergoing Coronary Angiography

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ABSTRACT

Background: Hemodynamic changes are among the side effects of diagnostic cardiovascular procedures. Hypothesizing that the anxiolytic effects of lavender oil inhalation could alleviate anxiety among patients undergoing diagnostic cardiovascular modalities, we conducted the present study on patients undergoing coronary angiography with the aim of assessing the effects of lavender oil inhalation on hemodynamic changes.

Method: This clinical trial enrolled 80 patients hospitalized for coronary angiography. The patients were randomly divided into 2 groups: the lavender group (n = 40), who inhaled lavender oil during angiography, and the control group (n = 40), who received only 1 mg of lorazepam on the night before the procedure (similar to the lavender group). Demographic data and hemodynamic variables (blood pressure and heart rate) were recorded in all the patients before and after lavender oil aromatherapy.

Results: Demographic parameters had no statistically significant differences between the 2 groups ($P > 0.05$). After lavender oil aromatherapy, hemodynamic parameters such as systolic and diastolic blood pressures and heart rate were significantly reduced (within normal ranges) in the intervention group by comparison with the control group ($P \leq 0.05$).

Conclusions: By reducing the stress response, lavender oil inhalation had efficacy in controlling blood pressure and heart rate in our patients undergoing coronary angiography. ***(Iranian Heart Journal 2017; 18(4):29-33)***

KEYWORDS: Lavender oil, Anti-anxiety agents, Hemodynamics, Coronary angiography

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Cardiovascular diseases are the major cause of morbidity and mortality in the world. The most common cause of death in patients over 65 years of age is cardiovascular diseases.[1] Lifestyle and eating habit changes, smoking, advances in technology, and aging lead to diabetes, high blood pressure, and high lipid levels—thereby increasing the prevalence of cardiovascular diseases. [2] Considering the life-threatening and progressive characteristics of cardiovascular diseases, diagnostic methods are of vital importance. Angiography, albeit an invasive modality, is deemed an important and standard diagnostic procedure for determining the severity and the location of blockages in coronary arteries. The major vascular side effects of angiography are bleeding, hematoma, distal embolism, artery thrombosis, and instability in hemodynamics—especially blood pressure and heart rate. [3]

Absolute bed rest and no leg movement are required for patients in order to obviate the angiography side effects. Patients are also recommended to place a sand bag weighing 2.5 to 4 kg on the procedure site. Based on a study in Iran, 71.8% of the patients suffered from back pain due to supine position and movement restrictions after coronary angiography. [4, 5] This status also causes tiredness and hemodynamic instability. [6]

Research shows that lavender oil inhalation through its dilating effects lessens the stress response (serum cortisol levels) and also increases the coronary artery blood flow. [7-9] Pharmacological and non-pharmacological methods are drawn upon for anxiety and stress reduction. Among the non-pharmacological methods, complementary treatments include aromatherapy, which is simple to use, cheap, and mostly noninvasive. [10, 11]

Lavandula angustifolia Mill (lavender) is a powerful aromatic agent. [12] It is a member of the aromatic herbaceous and evergreen *Lamiaceae* family. In Iran, lavender is widely used traditionally on the strength of its analgesic and sedative properties, which have been verified over the years by Iranian scientists including Zakariya al-Razi and Ibn Sīnā (Avicenna). [13] Aromatherapy is presently experimented in some countries such as Germany, Switzerland, Canada, the United States of America, and England. Inhalation of lavender oil decreases blood pressure and heart rate by improving physiologic strain and declining the serum level of cortisol. Earlier studies have shown the usefulness of aromatherapy in decreasing blood pressure among patients with hypertension and healthy people. [14]

Heuberger et al [14] showed that chiral fragrance was able to raise blood pressure, and Peng et al [16] indicated that aromatherapy exerted no major effects on heart rate as well as on systolic and diastolic pressures.

Since the monitoring and controlling of hemodynamic changes is one of the nursing care plans, we assessed the effects of lavender oil aromatherapy on blood pressure and heart rate in patients undergoing coronary angiography in a university referral heart hospital.

METHOD

This randomized double-blind clinical trial recruited patients who were hospitalized at a referral heart hospital. All the patients were admitted between June 2014 and December 2014 for coronary angiography. The inclusion criteria were comprised of age between 25 and 75 years, signing a written consent form, undergoing angiography for the first time, no history of using psychiatric drugs, no history of liver or pulmonary insufficiency, no allergy or asthma, and complete consciousness. The exclusion criteria consisted of need for general anesthesia, cardiac arrest, and hemodynamic instability. Eighty patients were participated in this study. All the patients filled out an informed written consent form to take part in this study. The patients were divided into 2 groups of control (n = 40) and intervention

(n = 40). The randomization process was done by using online software, and the randomization list was kept (concealed) with a third person. One hour before angiography, the patients' vital signs such as systolic and diastolic blood pressures and pulse rate were measured and recorded. The intervention group members smelled a piece of cotton saturated with 5 drops of lavender oil at a distance of 5 cm from their nose, with deep breaths for 5 minutes, and their vital signs were measured and recorded again. Lavender inhalation was done 30 minutes before angiography. The researcher applied the lavender oil, and an assistance (unaware of the group allocation) measured the patients' blood pressure and heart rate.The control group smelled a piece of cotton wool saturated with distilled water by the same method. In the duration of the study, none of the patients experienced complications such as myocardial infarction symptoms or allergy.

The collected data were analyzed using IBM SPSS Statistics for Windows, version 20.0. (Armonk, NY, USA). The quantitative and qualitative variables are presented as means and standard deviations (means ± SDs) and frequencies/percentages, respectively. The frequencies of the study outcomes were analyzed using the χ^2 test. The quantities variables were compared between the groups using the Independent Samples *t* Test. A *P* value equal to or less than 0.05 was considered statistically significant.

RESULTS

Of the 80 studied patients, 36 (45%) were male. The mean age of the patients was 50.89 ± 15.90 years. Sex, age, and marital status had no significant differences between the 2 groups, statistically (Table 1). Table 2 shows the means ± SDs of systolic and diastolic blood pressures and heart rate before and after the intervention in both groups. Based on the data in this table, there were significant differences regarding vital signs between the 2 groups ($P < 0.05$).

Table 1. Characteristics of the study population

Variable	Lavender Group (n=40)	Control Group (n=40)	*P*
Age (y)	50.48±15.41	51.30±16.32	0.31
Gender (male/female)	14 (35)/ 26 (65)	22 (55)/ 18 (45)	0.11
Married	5 (12.5)	12 (30)	0.09
Single	35 (87.5)	28 (70)	

Table 2. Distribution of the patients based on systolic and diastolic blood pressures and heart rate in the control and intervention groups before and after the intervention

Variable	Lavender Group (n=40)	*P*	Control Group (n=40)	*P*
Systolic blood pressure before intervention (mm Hg)	124.13±19.17	0.01	122.53±14.74	0.83
Systolic blood pressure after intervention (mm Hg)	118.38±17.75		122.13±14.74	
Diastolic blood pressure before intervention (mm Hg)	80.83±14.44	0.01	81.70±11.53	0.32
Diastolic blood pressure after intervention (mm Hg)	79.25±10.51		81.68±11.52	
Heart rate before intervention (beat/min)	83.45±15.61	0.01	90.88±16.9	0.61
Heart rate after intervention (beat/min)	78.25±11.95		90.78±16.09	

DISCUSSION

In the present study, we found that lavender oil inhalation had efficacy in preventing the pressor response of angiography-induced mental stress. Albeit an invasive procedure, angiography is regarded as an important and standard diagnostic procedure for determining the severity and the location of blockages in coronary arteries. The major vascular side effects of angiography are bleeding, hematoma, distal embolism, artery thrombosis, and instability in hemodynamics—not least blood pressure and heart rate. [3] Lavender oil inhalation has positive effects on controlling blood pressure and heart rate in patients undergoing coronary angiography by reducing

the stress response. [15] In our study population, pulse rate and systolic and diastolic blood pressures exhibited significant changes after the intervention. Overall, the intervention group had a better status than the control group. 4.Rezaei-Adaryani et al [4] reported that 30 minutes of lavender oil inhalation weekly for 8 weeks significantly reduced blood pressure among their study subjects. It seems that lavender oil inhalation can lessen pulse rate, blood pressure, and stress in cardiovascular patients by diminishing adrenocortico-tropines—leading to a reduction in epinephrine and adrenaline levels. [16, 17] Previous investigations have reported that lavender oil inhalation can control blood pressure and pulse changes, ameliorate digestive problems, and assuage different headaches. [11] A previous study indicated that overall satisfaction of patients who had received a mixture of lavender oil and O_2 was more than that with pure O_2 during biopsy. Kim et al [18] established that lavender inhalation significantly decreased both diastolic and systolic blood pressures. Chung et al [19] reported that contact to essential oils significantly reduced blood pressure and heart rate among their study population. Elsewhere, Tahmasebi et al [11] showed that aromatherapy considerably decreased heart rate amongst their patients undergoing angiography. Along the same lines, Ju et al [20] indicated that perfume massage dramatically reduced blood pressure and enhanced quality of life among their female subjects. Sayorwan et al [21] investigated the effects of lavender oil inhalation on the central nervous and autonomic system and reported that lavender aromatherapy successfully suppressed the autonomic nervous system and noticeably reduced heart rate, systolic and diastolic blood pressures, and skin temperature. All the expressed results are in accordance with the current study. However, Heuberger et al [14] showed that chiral fragrance increased blood pressure and Peng et al [16] indicated that aromatherapy had not major effect on heart rate and systolic and diastolic pressures.

CONCLUSIONS

In light of the results of the current study, it can be concluded that lavender oil inhalation by cardiac patients undergoing coronary angiography acts as a complementary therapy for limiting harmful hemodynamic fluctuations. Given the benefits of lavender oil aromatherapy and the fact that it is noninvasive, simple to use, and inexpensive, we suggest that this non-pharmacological method be utilized with a view to maintaining stable hemodynamics in cardiac patients undergoing invasive diagnostic procedures such as coronary angiography.

Limitations

In this study, we applied lavender 30 minutes before angiography; we would have obtained more robust results had we tested lavender at more time intervals. Furthermore, that our study is a single-center investigation can be deemed another drawback of significance. Multicenter studies on larger sample volumes could provide more powerful results.

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