Effects of Aromatherapy on Anxiety and Vital Signs of Myocardial Infarction Patients in Intensive Care Units

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ABSTRACT

Introduction: Patients with myocardial infarction (MI) who were admitted to CCU experience anxiety. Anxiety increases the risk of ischemia and worsens the prognosis of MI. The aim of this study was to determine the effects of inhaling lavender oil on anxiety levels and vital signs in MI patients. **Methods:** A randomized controlled trial was performed. Sixty patients with MI were randomly assigned to the intervention and control group. The intervention group inhaled the essential oil of Lavender for three days (20-30 min/day, 3times/day) using a non absorbent paper which was stained with three drops of lavender oil. In control group steriled water was used. Each patient was assessed before and after intervention for the following clinical parameters: anxiety by state-trait anxiety inventory (STAI) and vital sign by Vista monitoring. The data were analyzed using Chi-square, paired t-test and Analysis of Covariance. **Results**: Results showed statistically significant decrease in state and trait anxiety at the end of study from 60.26±9.29 to 41.56±7.57 ($P<0.001$) and 55.73±10.22 to 44.53±7.28 ($P<0.001$) respectively, but in the control group were observed statistically significant increase in state and trait anxiety ($P<0.001$). Also statistically significant decrease were observed in blood pressure at the end of the intervention ($p<0.05$). The values for state and trait anxiety and blood pressure decrease in the intervention group in comparison with the control group ($P<0.001$ and $p<0.05$, respectively). **Conclusion:** This study showed that inhalation of lavender oil can reduce state and trait anxiety level and blood pressure in patients with MI.

KEYWORDS: Lavender, anxiety, myocardial infarction, vital sign, blood pressure

INTRODUCTION

Cardiovascular Diseases (CVDs) have a high mortality rate. CVDs influence the general well-being, personal life and decrease the survival rate of patients.[1] It is predicted that these diseases will become first cause of death and disability worldwide until 2020.[2] Mortality rate of coronary artery disease is increasing in Iran which accounts for 46 percent cause of death in this country.[3]

Myocardial Infarction (MI) not only results in physical disabilities but affects the mental status of patients too. Many studies have shown that depression and anxiety are prevalent with this disorder.[4-6] Results from other studies also show that MI patients will experience anxiety during the first 24 hours after admission.[7] Anxiety in MI patients stimulate the systemic response which will ultimately produce epinephrine and norepinephrine. The rise of these catechol amines leads to increasing myocardial demand for oxygen and also increasing the heart rate, blood pressure and breathing rate.[8] Furthermore it will cause other outcomes such as increasing cardiac action potential, reducing quality of life, poor patient cooperation, depression, agitation, and poor prognosis in patients.[7,9] These makes patients less motivated in order to adhere to medical regimen.[10]

Prevalence of anxiety in patients experiencing an acute cardiac event is 70-80 percent.[11] There are some evidence that MI patients with anxiety have 2.5 times higher risk for ischemia.[8] Therefore, reducing anxiety in these patients is vital. Drugs have some side effects besides their useful advantages so it is preferred to use drugs with lower side effects. Today, there is a great tendency to use herbal drugs and complementary methods in treating

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diseases.[12,13] Aromatherapy is a form of alternative medicine which influence our sensation towards odor.[14]

Aromatherapy has been reported to reduced serum cortisol and improve coronary flow velocity reserve[15] as well as decrease the anxiety level and increase sleep quality in percutaneous coronary intervention[16], in patients with coronary artery disease.[17] It has shown by Stevensen that foot massage using neroli essensial oil was effective psychological benefit in patients with cardiac surgery.[18] Edge has investigated the effect of Aromatherapy massage on mood, anxiety and relaxation.[19] Hwang suggested that the inhalation method using essential oils can be reduced psychological stress responses and serum cortisol levels, as well as the blood pressure of clients with essential hypertension.[20]

Results from aromatherapy studies shown that they stimulate olfactory receptors and send messages to the limbic system which finally help to release endorphins, enkephalin and serotonin from this system that will reduce anxiety.[21] MI patients will experience anxiety due to their unstable physical and mental status, stressful environment, machines alarms in CCU and changing lifestyle after MI. Anxiety has a negative outcome on cardiac patients and it is not diagnosed and managed properly so there is a need to decrease the anxiety level in these patients. The aim of this study was to assess lavender extracts on anxiety and vital signs of MI patients hospitalized in critical care units.

MATERIAL AND METHODS

Sampling

The inclusion criteria for this study were: patients diagnosed with MI, age between 30-70, stable hemodynamic status, no history of Alzheimer, Mental disorders, addiction and anti-anxiety drugs, acquiring score 20 or more from the Spielberger State-Trait Anxiety Inventory scale. The exclusion criteria included: non-cooperation with the research team, history of allergy and allergic reaction during the intervention, sudden change in hemodynamic status.[15, 22-25] Sixty patients participated in this study according the inclusion and exclusion criteria. All of patients received tablet Alprazolam 0.5 mg every night.

This was a single blind randomized clinical trial that was performed at AL Zahra heart hospital in Shiraz. The participants were selected by the permuted block randomization method. The intervention group consisted of 15 male and 15 female and the control group had also 15 female and 15 male. Three patients were included on the intervention group on even days from CCU1, CCU2 and CCU3 and three patients were included in control group on odd days from CCU4, CCU5 and CCU6 ward.

Study design and setting

When hemodynamic status of MI patients became stable the vital signs were recorded on the relevant form. The Spielberger State-Trait Anxiety Inventory scale (STAI) was completed by the patients. Literate participant solely completed the form after the investigator's explanation. The scale was completed by the researcher for illiterate patients. Those who scored 20 or more on the STAI were included in the study. At the second day of hospitalization the STAI and vital sign form was completed by the researcher. Three droplet of lavender extract poured on a non-absorbent handkerchief and then attached to the patient's clothes.

Participants were asked to breath normally for 20 to 30 minutes. This intervention performed three times a day in morning, evening and night shift for three days period. The lavender extract was provided by zardband herbal company in Tehran with the chromatography method. At the end of the third day the SATI and vital sing form was again completed by the researcher. The same procedure was performed on the control group but the lavender extract was replaced by the placebo which was sterile water.

Instruments

The data gathering instruments in this study were subject selection form, demographic questionnaire, vital sign forms and the Spielberger State-Trait Anxiety Inventory scale.

Subject selection form

This form consists of inclusion and exclusion criteria which was completed by interview and medical record information.

Demographic Questionnaire

This questionnaire included personal information such as age, sex, marital status, occupation status, educational level, living place, hospitalization history which was completed by interview and medical record information.

Spielberger State-Trait Anxiety Inventory scale

This instrument consists of independent self-evaluation scale for measuring state anxiety and trait anxiety. The state anxiety scale has 20 items that evaluate the current emotional status at the time of answering the questions. The trait scale also has 20 items which evaluate the general emotional status. The answers are based on 1-4 scale. Score 4 shows high level of anxiety. According to this level of anxiety, 10 items from the state anxiety scale and 11 items from the trait anxiety scales are evaluated. Obtaining higher score for other statements reveal the non-anxiety level which accounts for 10 statements from the state anxiety scale and 9 items from the trait anxiety scale.

The scores from both scales range between 20-80. Twenty means the lowest level of anxiety and eighty means the highest level of anxiety.[26,27] The validity of this scale has been examined by nazemian in 2010.[28]

Internal consistency coefficients for the scale have ranged from 0.86 to0.95; test-retest reliability coefficients have ranged from .65 to .75 over a 2-month interval.[29]

The reliability of this scale has been determined with alpha Cronbach 0.889 by Tafazoli in 2012.[30] In order to assess the effect of lavender extract on anxiety level, patient's anxiety were categorized in two groups. The first group included mild, mild to moderate and moderate to severe anxiety. The second group consist of mild to moderate severity, moderately severe and very severe.

Vital sign form

This form included temperature, breathing rate, systolic and diastolic blood pressure and pulse rate. In order to ensure stable hemodynamic status of patients this form was completed before and after the intervention. The vital sign was assessed by the cardiac monitoring in each unit. The monitoring was calibrated before the intervention. Comparison calibration method was used in this survey. At first the blood pressure of five subjects were measured by the cardiac monitoring with vista brand made in Japan (Sairan IEJcardioset lx110, Japan). Blood pressure was then measured by a Mercury sphygmomanometer (Alpk 20123 made in Japan). The output data were compared together. The error rate of digital sphygmomanometer to mercury sphygmomanometer was calculated.

Analysis

Descriptive static such as mean, median, frequency and measure of central tendency used in this study. The Shapiro-Wilk test used for normality distribution. Mann Whitney and Independent samples T-test were used for quantitative variables and Fisher exact and chi square used for qualitative nominal and ordinal variables. Regarding the research objectives, independent t test and analysis of covariance were used for comparing the anxiety level between two groups and paired sample t test used for comparing inter group anxiety level.

Ethical Consideration:

This study was approved by ethical committee of Sabzevar university (ruling number: medsab.rec.93.1) of medical science and CCU authorities at Al Zahra heart hospital in Shiraz. Participants were notified about the advantages and disadvantages of this intervention and the informed consent were obtained from them. This study registered in Iranian critical trial, code: irct2014081718825n1

RESULTS

There was no significant difference in age, sex, marital status, educational level, occupation status and hospitalization history between the two groups. The mean age of participants in the intervention and control group was 54.70±8.57 and 58.6±10.26 respectively. 38.3 percent of participant was illiterate which accounts for 46.7 percent in control group and 30 percent in intervention group. The majority of patients (75 percent) were living in city which was 73.3 percent for control group and 76.6 percent for intervention group. Most patients had moderately severe anxiety which was 38.3 percent in control group and 45 percent in intervention group (Table I).

Table I: Anxiety level of the enrolled patients (n=60)

	mild	Low moderate	High moderate	Relatively severe	severe	Very se-vere
State Anxiety	1 (1.6)	5(8.3)	6(10)	32(38.3)	16 (26.4)	0(0)
Trait Anxiety	1 (1.6)	6(10)	17(28.3)	27(45)	8 (13.3)	1 (1.6)

Note: Data are presented as frequency and percent

There were no statistically significant differences between the control and intervention group in baseline measures of state anxiety (56.60±10.14 vs 60.26±9.29, p=0.063) and trait anxiety (54.13±0.17 vs 55.73±10.22, p=0.526), while at the third day there was a significant reduction in state anxiety level of intervention group (From 60.26±9.29 to 41.56 ± 7.57P<0.001). However, the anxiety level increased in control group significantly (From 56.6 ± 10.14to 63.30 ± ,5.19P<0.001). There was a significant difference between two groups at the end of the study (P<0.001) (Table II).

Covariance analysis showed that age(p=0.004, ß= 6.29) and hospitalization history (P= 0.017, ß=4.44) had relationship with state anxiety .In addition, age (P=0.002, ß=5.91) and hospitalization history had (P=0.02, ß=3.82) significant relationship with trait anxiety.

Table II: The effect of inhaling lavender oil on anxiety

	Intervention group		Control group	
	baseline	Post training	baseline	Post training
State Anxiety	60.26± 9.29	41.56±7.57*†	56.60± 10.14	63.30± 5.19*
Trait Anxiety	55.73± 10.22	44.53±7.28*†	54.13± 9.17	59.96± 7.17*

Note: Data are presented as mean ±SD,* p<0.001 compared with baseline measure. † p<0.001 compared with control group

In order to understand the effect of lavender extract on each anxiety level, the state and trait anxiety were divided to two groups. The first group included (mild anxiety, mild to moderate and

moderate to severe); the second group included (mild to moderate severity, moderately sever and very severe.). The covariance analysis showed that the state and trait anxiety in intervention group was significantly reduced comparing to control group ($p<0.01$) (Table III).

Table III: Analysis of covariance for effect of inhaling lavender oil on State & Trait anxiety at the end of study

Variable	ß coefficient	P- value
Trait anxiety		
Group 1	13.339	P<0.001
Group 2	18.824	P<0.001
Stait anxiety		
Group 1	15.088	P=0.01
Group 2	22.699	P<0.001

Note: The group1 included mild anxiety, mild to mode rate and moderate to severe. the group 2 included mild to moderate severity, moderately sever and very severe anxiety.

There was no significant difference between blood pressure in the two groups at the first day. However, after the intervention the systolic and diastolic blood pressure decreased significantly in the intervention group (From 131.46 ±19.46 to 126.6±12.88 with P=0.042, From 76.90± 15.45 to 73.20 ± 10.45 with p=0.048) (Table IV).

Table IV: The effect of inhaling lavender oil on blood pressure

	Intervention group		Control group	
	baseline	**Post training**	**baseline**	**Post training**
Systolic	131.46± 19.46	41.56± 7.57*†	137.30± 17.44	139.63± 16.13*
Diastolic	76.90± 15.45	73.20± 10.45*†	79.30± 11.60	80.43± 11.02*

*Note: Data are presented as mean ±SD,** p<0.05 compared with baseline measure. † p<0.05compared with control group

DISCUSSION

MI has physical and psychological effect on patients. One of the psychological effect is anxiety.[31] In this study it was revealed that most participants had state and trait anxiety in a moderately severe level. Hemingway et al (1999) showed that most patients with MI had severe and very severe state and trait anxiety.[31]The result of the study performed by Perpiñá-Galvañ et al (2009) showed that MI patients had a high level of moderate anxiety.[32] Elliot (2000) in a survey performed on critical care unit patients showed that most participants had moderate and moderately severe state and trait anxiety.[33] It seems that anxiety is prevalent in patients hospitalized in critical care units.

The result of this study showed that the level of state and trait anxiety significantly reduced in intervention group which is compatible with the result performed by Kutlu et al (2008).[34] In addition, in a study by Burns et al (2007) which assessed the use of herbal extract during natural delivery, it was concluded that lavender extract is one of the most effective extracts for decreasing anxiety during natural delivery. One notable point in the Burns study was that participant chose both the extract and its using method. It was revealed that lavender extract was the first choice (45 percent) and inhaling the extract was the preferred method (37 percent). [25]

However, a study performed by Holm & Fitzmaurice showed that music therapy along with citrus aurantium aromatherapy is not effective in reducing the anxiety of children's companion at emergency ward. It seems that the hospital had ventilation system. The steamers fluid device was used for aromatherapy so the effect of citrus aurantium was reduced. In other hand, the type of extract in these two studies were different.[35]

Itai et al (2000) assessed the psychological effects of aromatherapy in hemodialysis patients. The results showed no significant difference in terms of depression and anxiety between intervention and control group.[36] It seems that the sample size was little (n=14) and the Hamilton depression and anxiety scale evaluated the overall anxiety in this population.

Graham et al (2003) performed a study on assessing the effect of inhaling aromatherapy during radiotherapy on anxiety level of patients with cancers. The result showed that the anxiety level was significantly reduced comparing to the intervention group.[37] Wilkinson et al (2007) assessed the effect of aromatherapy on depression and anxiety of breast cancer patients. The result showed that applying aromatherapy with massage method did not reduce the anxiety in intervention group. It seems that this inconsistency with the our study was due to the method of applying the extract which was different from our study.[38] In a study performed by Muzzarelli (2006) on effect of aromatherapy on reducing the anxiety before endoscopy procedure, it was concluded that inhaling lavender extract for five minutes had no significant effects on state and trait anxiety in both intervention and control group.[39] It is probable that the intervention period was short and the lavender extract (10 percent) was used. However, in our study we used the pure lavender extract for 20-30 minutes. In addition the result of our study showed that lavender extract had effects on mild to moderate severity,

moderately severe and strongly severe state and trait anxiety.

The results from our study revealed that inhaling lavender extract is effective on reducing systolic and diastolic blood pressure. Cho et al (2013) concluded that inhaling the mixed lavender and chamomile extract for ten minutes is effective in reducing systolic and diastolic pressure after percutaneous coronary intervention.[16] In a study performed by Cha et al (2010), patients were divided in two group of inhaling lavender extract and lemon extract. The systolic and diastolic blood pressure in the lavender extract group were significantly lower than those inhaling lemon extract.[40] One notable point in the Cha study was that most participants had high blood pressure.

Study limitation

It was not possible for us to perform double blinded study because the lavender extract is aromatic. In addition, Benzodiazepines could interfere with reduction of anxiety, but all the participants in the two groups used alprazolam 0.5mg according to the physician's order.

CONCLUSION

The result of this study showed that inhaling pure lavender extract for 20-30 minutes is effective in reducing anxiety and blood pressure on MI patients hospitalized at CCU ward. Lavender extract is more effective when patients had sever anxiety level. According to the researches most hospitalized patients at critical care units experience moderate and higher level of anxiety. The high blood pressure also complicate the patient's medical condition. It seems that inhaling the lavender extract can be a cost effective and a simple medical method which can easily performed by nurses to all MI patients at CCU ward.

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