The Efficacy of Aromatherapy With *Melissa officinalis* in Reducing Anxiety in Cardiac Patients: A Randomized Clinical Trial

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Abstract

Objectives: Anxiety is among the most prevalent psychological disorders induced by myocardial infarction. Traditional medicinal herbs have long been used to reduce anxiety. Avicenna was the first physician in the world who referred to the inotropic effects of *Melissa officinalis* as a fragrant herb. In addition, he emphasized the strengthening effects of this herb on the heart, nerves, and brain with exhilarating effects. Further, *M. officinalis* plays a role in removing nightmares, phobias, and palpitations. Accordingly, the present study assessed the effectiveness of aromatherapy using *M. officinalis* in alleviating anxiety in cardiac patients.

Materials and Methods: This study was conducted on 96 patients who were equally assigned into 2 groups on a quasi-random basis. The case group underwent aromatherapy in the CCU as a cotton patch measuring 15 * 15 cm soaked in three drops of *M. officinalis* extract and attached to their collar for 30 minutes twice a day during 3 successive days. However, the same treatment pattern was followed by the control group while they only received odorless sesame oil on a similar cotton patch attached to their collar. Furthermore, the patients completed the Spielberger anxiety questionnaire before the intervention, on the second day after the second phase of aromatherapy, and immediately after completion of the intervention. The data were analyzed using independent *t* test.

Results: Based on the findings, no statistically significant difference was observed in the mean total scores of anxiety between the 2 groups at pretest and during the treatment ($P \geq 0.05$). However, there was a significant difference between the mean total scores of anxiety in both groups at the post-test ($P \leq 0.05$).

Conclusions: In general, aromatherapy with *M. officinalis* extract reduced anxiety in cardiac patients. This method, as one branch of complementary medicine, can exert positive effects on diminishing the anxiety of cardiac patients.

Keywords: Anxiety, Aromatherapy, Cardiac disease, *Melissa officinalis*

Introduction

Coronary artery diseases (CADs) are among the major causes of morbidity and mortality around the world that predispose to disability, economic problems, and death more than any other disease (1). According to Saadat et al, nearly 26.4% of mortality cases in Iran (18.1% in males & 8.3% in females) occur due to CADs with a growing mortality rate of 27%-37% (2,3). CADs account for a high rate of mortality (4) and impose some long-term limitations on individuals' lives due to their debilitative nature through disturbing the general well-being resulting in the reduced survival of the patients (5). The incidence of psychological stresses like tension and depression are among the heart complications. Anxiety is a behavioral, cognitive, and physiologic response to vague threatening stimuli (6) and is, in fact, an unpleasant and unavoidable mental phenomenon. In addition, the incidence of anxiety following cardiovascular disease is intensified and lengthens the condition, interferes with treatment, and ultimately, delays recovery (7). Several studies indicated

that myocardial infarction patients refer to the fear of death and recurrent myocardial infarction as the most common cause of anxiety (8). This parameter may lead to failure and incompatibility in patients so that it deprives them of a major part of abilities and facilities (9). Anxiety may be controlled by both pharmacologic and non-pharmacologic methods (10). The pharmacologic methods suffer from complications such as hypotension, suppression of vital functions including respiration, heartbeat, drowsiness, nausea, vomiting, constipation, and occasionally sensitivity reactions and even anaphylactic shock. Further, these methods cause numerous psychosomatic complications and impose high costs of general health on the healthcare system of the country (11). Conversely, aromatherapy is a non-invasive procedure in complementary medicine aimed at altering the mentality, performance, or the health of an individual with the use of fragrant oils and extraction of volatile fluids of the plants by vapor or pressure which dates back to the past centuries (12-14). *Melissa officinalis* is regarded as one of these fragrant herbs (15). It belongs

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to the mints family. Although the accurate method of action of this herbal plant is not clearly known yet, it seems that the presence of active compounds in its leaves like monoterpenoids, flavonoids, and polyphenolic particles play a significant role in its properties (16). *M. officinalis* is used in some countries for treating a migraine, insomnia, and gastric problems, as well as improving cardiac function and memory. Furthermore, it is considered an anxiolytic, narcotic, sedative, tranquilizer, and anti-spasm agent (17). Various studies approved the positive benefits of aromatherapy on decreasing anxiety, especially in open-heart surgery candidates (18), the first phase of labor in gravida 1 woman (19), and before ambulatory surgery (20). However, the findings of previous studies have not always been significantly favorable. The results of the studies by Muzzarelli et al (21) and Khoshkesht et al (22) failed to approve the positive effects of aromatherapy on reducing anxiety. Nevertheless, the therapeutic effects of aromatherapy are not clinically well supported so that there is little or contradictory evidence in the context of Iran concerning the beneficial effects of aromatherapy on diminishing anxiety levels and its following psychological changes. The complementary interventions can be used in the nursing interventions. Moreover, considering the importance of diminishing anxiety and stress in cardiac patients due to untoward sequelae, aromatherapy with *M. officinalis* can serve as a cheap and safe intervention without any adverse complications. Therefore, this study investigated the efficacy of aromatherapy with *M. officinalis* in decreasing anxiety in patients in CCU.

Materials and Methods
Drug Preparation
Melissa officinalis as a fragrant herb (23) was first reported by Avicenna to have inotropic effects. Additionally, this herb was found to have strengthening effects on the heart, nerves, and brain with exhilarating effects, in particular (24). In addition, *M. officinalis* is highlighted to have a role in overcoming nightmares, phobias, and palpitations (25). So far, no significant complications and pharmaceutical interferences have been reported about this herb (26). First, the extract and odorless sesame oil of *M. officinalis*, required for the purpose of the study, were purchased from Herbal Extract Pharmaceutical Company under the Ministry of Industry and Mines health license No. 6884/4.128. They were employed after determining their concentrations using the weighting method by the company.

Participants
This single-blind randomized clinical trial was implemented to explore the efficiency of aromatherapy with *M. officinalis* in reducing anxiety in cardiac patients at CCU ward of Imam Hossein hospital in Tehran, Iran during December-February 2016. Totally, 96 patients out of the CCU inpatients were selected based on the inclusion criteria using convenient sampling method. Further, considering $\beta = 0.20$, $\alpha = 0.05$, $\mu_1 - \mu_2 = 9.3$, $\sigma = 17.4$, and $\rho = 0.8$, a total of 48 patients were estimated to be required in each group.

$$n_1 = n_2 = \frac{2\sigma(1-\rho)(Z_\alpha + Z_\beta)^2}{ms^2(\mu_1 - \mu_2)^2}$$

The inclusion criteria included aged 20-75 years, acute coronary artery syndrome diagnosed by a cardiologist, absence of olfactory problems, no cardiopulmonary resuscitation (CPR) at the time of emergency room admission, no drug addiction, no pain at the time of questionnaire completion, full consciousness at the time of questionnaire completion, acceptable verbal and auditory abilities to complete the questionnaire, a history of asthma and allergy to the plants and flowers, lack of affliction with known psychological disorders and hypothyroidism, and lack of using other methods of complementary medicine during at least the last week. Furthermore, the exclusion criteria were CPR during the study, demonstrating allergy to *M. officinalis* fragrance during the study, affliction with critical cardiac dysrhythmia like ventricular tachycardia, ventricular fibrillation, and cardiogenic shock during the study, and patients' lack of inclination for cooperation. The required data were collected by a demographic questionnaire and the Spielberger Standard Anxiety Measurement Scale developed by Spielberger et al. This questionnaire contains 40 items on a 4-point Likert-type scale and is used to measure the overt and covert anxiety ranging from Very little = 1, Little = 2, Much = 3, and Very much = 4. The total score of anxiety (overt and covert) on this inventory ranges from 40 to 160. Separately taken, a score of 20 for overt and covert anxiety implies lack of anxiety while a score of 80 indicates the greatest rate of anxiety. Moreover, anxiety scores of 20-39, 40-59, 60-80 represent slight, moderate, and acute anxiety, respectively. Spielberger et al reported Cronbach $\alpha = 0.92$ and 0.90 for overt and covert anxiety scale and that of the whole test was equal to $\alpha = 0.94$ (27). The scale underwent validity and reliability testing in several studies in Iran (28-30).

The patients, residing in CCU ward of Imam Hossein hospital, were divided into case and control groups by randomly selecting either A or B lottery ticket. It should be mentioned that the CCU staff were blind to the method of assigning patients to either experimental or control groups. Nor were they aware of the results of the interventions.

First, the researcher was assured of the olfactory health of the patients who used coffee as a stimulant. Then, the demographic information questionnaire was completed for each patient. Next, aromatherapy was performed using a cotton patch measuring 15*15 cm, soaked in 3 drops of *M. officinalis* extract and attached to their collar for the case group and a similar cotton patch soaked in odorless sesame oil stuck to the collar of patients in the control group. This was performed in the CCU ward for 30

minutes twice daily for three consecutive days. Afterward, Spielberger anxiety scale was completed by the patients before the intervention, on the second day after the second phase of aromatherapy, and immediately after completing the intervention. Noteworthy that it was completed by the researcher through an interview for the illiterate patients.

Statistical Analysis

The gleaned data were analyzed using the SPSS software, version 21. The quantitative and qualitative data were described as mean ± SD and percentage, respectively. In addition, Kolmogorov-Smirnov test and the non-parametric tests were used to examine normal distribution or lack of normality of the data. Finally, a t test was applied to compare the anxiety scores of the 2 groups.

Results

A total of 96 patients enrolled in this study out of whom 2 cases (1 in the case and 1 in control groups) left the study. Further, 2 patients in the case group were omitted during the course of the study since they developed dysrhythmia (Figure 1). Finally, 92 cardiac patients participated in the study. Table 1 demonstrates the socio-demographic data of the patients. The majority of the patients (32.6%) aged 51-60 years. Slightly over half of them were males (54.3%) and 76.1% of the patients were married. Furthermore, the patients were examined by the cardiologist and most of them (in both groups) were diagnosed suffering from unstable angina (56.5%). Moreover, 68.1% of the control patients and 64.4% of the case-patients had a positive history of hypertension. Additionally, 44.7% and 53.3% of the patients had a history of diabetes mellitus in control and case groups, respectively. Based on the statistical tests, no statistically significant difference was found between the case and control groups regarding demographic information (Table 1).

In addition, the results of the Kolmogorov-Smirnov test suggested a normal distribution of the total anxiety-related data in both pretest and posttest in case and control groups. Further, the results of the independent t test demonstrated no significant difference in the mean total score of anxiety between the case and control groups in the pretest and during the treatment ($P \geq 0.05$). Conversely, however, the results revealed a significant difference ($P \leq 0.05$) between the 2 groups in the mean total score of anxiety in the posttest (Table 2 and Figure 2).

Discussion

The present study focused on determining the effect of aromatherapy with *M. officinalis* on anxiety level in CCU inpatients. The findings indicated a statistically significant difference in the rate of anxiety in patients between the 2 groups after the intervention. In other words, *M. officinalis* aromatherapy reduced the anxiety level of the patients in the intervention group. Reviewing previous literature on using *M. officinalis* in coated tablet, capsule, and tea-bag forms indicated that this herb has a significant effect on improving and reducing the symptoms of anxiety in patients with mild-to-moderate anxiety disorders (31), burns patients (32), and those with chronic stable angina
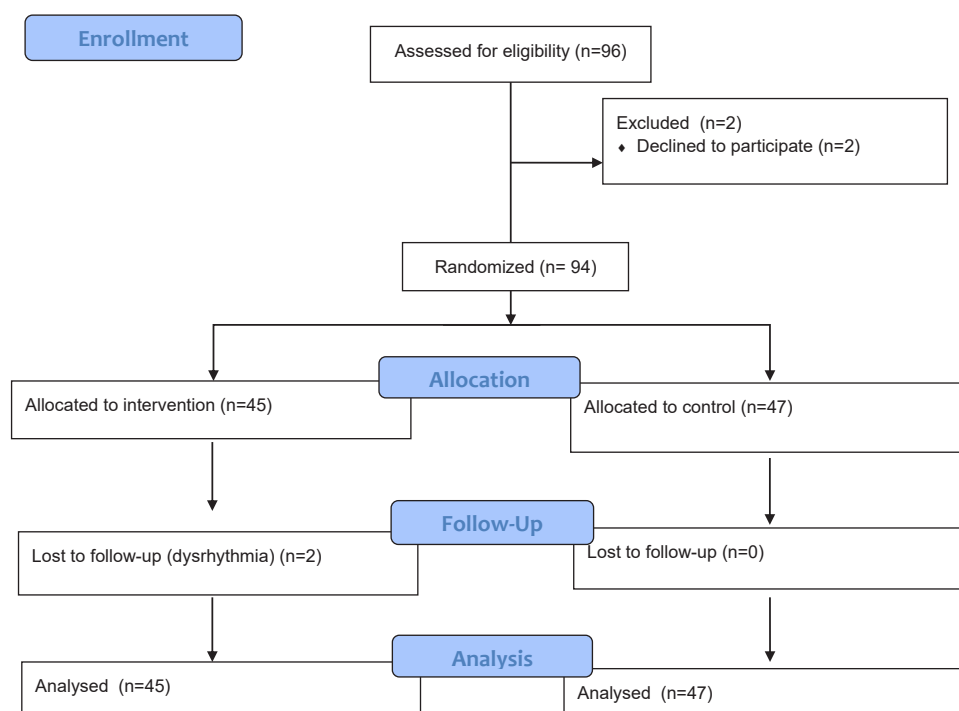

Figure 1. CONSORT Flow Diagram of the Study.

Table 1. Frequency Distribution of Demographic Data of the Patients in Case and Control Groups

| | Group | | P Value |
	Control No. (%)	Intervention No. (%)	
Gender			0.83[a]
Male	25 (53.2)	25 (54.3)	
Female	22 (46.8)	20 (46.7)	
Total	47 (100)	45 (100)	
Mean (SD)	53.08 (9.4)	53.88 (9.86)	
Marital status			0.99[b]
Single	3 (6.4)	3 (6.7)	
Married	35 (74.5)	35 (77.8)	
Divorced	2 (4.3)	2 (4.4)	
Widow	7 (14.9)	5 (11.1)	
Diagnosis			0.78[a]
Unstable angina	25 (53.2)	27 (60)	
NSTEMI	13 (27.7)	10 (22.2)	
STEMI	9 (19.1)	8 (17.8)	
Hypertension history			0.82[a]
Yes	32 (68.1)	29 (64.4)	
No	15 (31.9)	16 (35.6)	
Diabetes mellitus history			0.53[a]
Yes	21 (44.7)	24 (53.3)	
No	26 (55.3)	21 (46.7)	

Abbreviations: NSTEMI, Non-ST segment elevation myocardial infarction; STEMI, ST-segment elevation myocardial infarction; SD, Standard deviation.
[a] Chi-square test; [b] Fisher exact test.

**Table 2.** Mean and SD of Total Anxiety Score of CCU Inpatients Before, During, and After Intervention

Variable	Group	Mean (SD)	P Value
Pretest	Control	90.14 (18.76)	P > 0.05
	Case	89.62 (16.79)	
During Intervention	Control	88.70 (22.62)	P > 0.05
	Case	83.51 (15.89)	
Post test	Control	88.46 (18.85)	P < 0.05
	Case	80.24 (13.63)	

(33). However, in all the above-mentioned studies, *M. officinalis* was used in the form of the non-essential oil.

Reductions in the corticosterone level, inhibition of gamma-aminobutyric acid catabolism, and serotonergic activity are the three theories regarding the *M. officinalis* mechanism of action on anxiety and the related neurological disorders (32).

Furthermore, other researchers suggested that the administering herbal medicines of *M. officinalis* can reduce depression in patients with coronary diseases (34) and burns (35), decrease the severity of physical, psychological, and social signs and symptoms of premenstrual syndrome (36), improve mood and cognitive performance (37), cognition and agitation of patients with mild to moderate degrees of Alzheimer disease (38), and relief the benign heart palpitations (39) and sleep disturbances (40) such as insomnia (41) in human studies.

Although *M. officinalis* is considered as a safe and
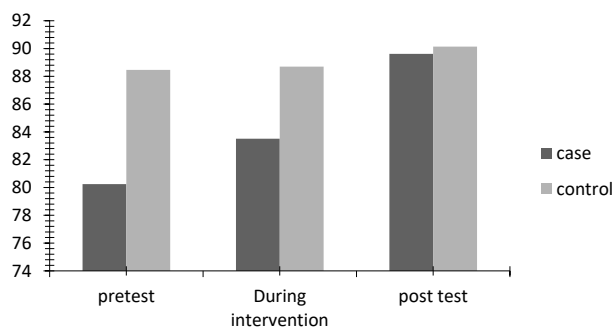
Figure 2. Determining the Rate of Total Anxiety in CCU Patients Before, During, and After the Intervention in the Case and Control Groups

effective herb and recommended as a remedy for disorders like tension, restlessness, and irritability in modern phytotherapy, further research is needed to approve the long-term effects of this herb (42).

Reducing anxiety in patients is an important goal and responsibility for providing holistic care for the nurses. However, consistent and effective management of all the anxiety-inducing procedures is not merely an ethical obligation for the nurses rather it may produce long-term outcomes for the patients. Moreover, using non-pharmacological measures such as aromatherapy for reducing the anxiety (40,43-45) can increase the quality of care and reduce short-term and long-term complications of anxiety in heart patients.

In a review of the literature, no human study was found regarding the effect of *M. officinalis* on anxiety. However, the animal study by Modarresi et al (44) reported that the hydroalcoholic extract of this herb (200 mg/kg of mouse body weight) significantly enhanced the presence of mice in the open arms compared to the control and diazepam groups (P ≤ 0.05). Additionally, another study investigating the anticonvulsive and narcotic effects of the hydroalcoholic extract of *M. officinalis* leaves on convulsions induced in mice by pentylenetetrazol, Ghayoor et al demonstrated that this herb diminished convulsion and mortality in wild mouse (45). In addition, Heidari et al (34), exploring the effect of *M. officinalis* on postoperative depression in patients with gamma-aminobutyric acid, found that the intervention resulted in decreased postoperative depression in the case group compared to the placebo group (P = 0.008). Further, Scholey et al reported that *M. officinalis* improves mood and cognitive performance (46). Furthermore, Kalvandi et al suggested that using *M. officinalis* and garden sage exerted a significant positive effect on the severity and duration of dysmenorrhea in women (47). Moreover, Taavoni et al (35) approved the efficacy of *M. officinalis* complement in improving insomnia in menopausal women.

However, Chang and Shen (48) found no significant difference in the effect of using a diluted solution of orange, lavender, and frankincense on anxiety in end-stage cancer

patients who received aromatherapy massage compared to the controls who received ordinary oil massage ($P \leq 0.001$).

Given that the results of the present study are in line with the findings of other similar studies, aromatherapy can be recommended as a branch of complementary medicine for creating positive effects on reducing anxiety in patients. Additionally, inhalational aromatherapy with *M. officinalis* extract as a cheap, safe, and effective method of complementary medicine can be easily performed by nurses while it does not interfere with other medical care. It is noteworthy that further research is required in this respect. The strong points of this study include using random sampling, having a control group, being single-blind, and encompassing a sufficient sample volume.

Conclusions

In general, the findings demonstrated that aromatherapy with Melissa officinalis alleviated anxiety in heart patients. Since this treatment modality is currently applied both as a useful procedure in complementary medicine in many countries and as a holistic nursing care instrument, it can be included in the educational syllabus of nurses or even faculty members of the nursing schools.

Limitation of the Study

The possible lack of honesty in responding to questionnaire items due to improper mental status of the patients can be regarded as the limitation of the current study.

Conflict of Interests

Authors have no conflict of interests.

Ethical Issues

The Committee of Ethics in Human Research at Shahid Beheshti University of Medical Sciences approved the process of study (ethical code: IR.SBMU.PHNM.1395.485) and the protocol was registered in the Iranian Registry of Clinical Trials (identifier: IRCT201709219014N188). Additionally, the research objectives and process were explained to all the patients and informed written consent was obtained accordingly. All the patients were assured of patient anonymity and information confidentiality, and they had the right to withdraw at any time. .

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