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Comparing the effects of aromatherapy massage with passion flower and sesame essential oils on pain intensity among patients undergoing coronary artery bypass grafting: a randomized parallel trial

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Abstract

Background: Pain is one of the most common complaints of patients after coronary artery bypass graft (CABG) surgery.
Objectives: The aim of this study was to compare the effects of aromatherapy massage with passion flower and sesame essential oils on postoperative pain intensity among patients with CABG surgery.
Methods: This double-blind randomized parallel trial was conducted from November 2019 to April 2020. Sixty candidates for CABG were conveniently selected from Chamran hospital, Isfahan, Iran, and randomly allocated to group A (aromatherapy massage with passion flower essential oil) and group B (aromatherapy massage with sesame essential oil). Aromatherapy massage for all participants was provided in four twenty-minute sessions on four consecutive days. Pain intensity was assessed before and thirty minutes after aromatherapy massage using a visual analogue scale. The Chi-square, independent-samples *t*, were used to analyze the data.
Results: The mean score of pain intensity in groups A and B was respectively 8.03±.08 and 7.23±1.38 on the first day, and 4.43±1.19 and 5.4±1.1 on the fourth day. A significant difference between the two groups was observed respecting the mean score of pain in the first, third, and fourth days ($P < 0.05$).
Conclusion: Aromatherapy massage with passion flower essential oil is more effective than aromatherapy massage with sesame essential oil in significantly reducing pain intensity among patients with CABG surgery.

Keywords: Massage, Aromatherapy, Passiflora, Pain Measurement, Coronary Artery Bypass grafting.

Introduction

Coronary artery bypass graft (CABG) surgery is one of the most common surgeries for patients with coronary artery disease.[1] Each year, more than eight million individuals in the world undergo CABG surgery.[2] Pain is a highly common complication after this surgery[3] and postoperative pain management is one of the most important challenges for physicians and nurses. A review study showed that physicians' and nurses' concern about the side effects of analgesics is a major cause of ineffective postoperative pain management.[4] Therefore, non-pharmacological modalities such as massage therapy are used for postoperative pain management.[5,6]

Massage therapy refers to the manipulation of soft tissues and muscles to maintain and improve bodily functions, facilitate the healing of injuries, and promote relaxation.[7] It is an easy to use, safe, and inexpensive non-invasive modality.[8] However, studies into the effects of massage therapy after cardiac surgeries reported contradictory results. For example, some studies showed that massage therapy reduced anxiety, stress, and postoperative pain,[9-11] while a study showed its insignificant effects on these outcomes.[12]

Aromatherapy massage, i.e., combined massage therapy

and aromatherapy, is a very effective modality to deliver the essential oils of medicinal plants to the body through the skin.[13] The essential oils of various plants have sedative properties. Examples of these plants are rose, hemp, orange blossom, violet, lavender, common hop, and passion flower.[14] Previous studies reported that aromatherapy using lavender, eucalyptus, and chamomile can reduce postoperative pain.[15-18]

Sesame is one of the oldest cultivated crops that has been used in India for more than 5 thousand years.[19] Among vegetable oils, it has a high oil content. Various properties of sesame oil, such as anti-inflammatory, antiviral, antifungal, antibacterial and pain-relieving effects, have made it a useful component of some pharmaceutical products.[20,21]

Passion flower, scientifically known as *Passiflora incarnata L.*, belongs to the *Passiflora* genus and the *Passifloraceae* family. It is a fast-growing perennial vine widely spread in tropical and warm regions.[22] Passion flower is used in traditional medicines around the world and has known pharmacological effects[9] such as analgesic,[23,24] anti-spasmodic, stimulant,[23] anxiolytic, anti-diabetic, anti-epileptic, anti-asthmatic, and anti-helicobacter pylori effects.[24] Hence, it is used for the treatment of dysmenorrhea, neuralgia, tachycardia,[23] neurologic restlessness, insomnia, anxiety, neuropathic intestinal complications,[25] and neuropathic pain.[22] Its effects are mainly attributed to its opioid components and GABAergic mechanisms.[26]

Despite the potential positive effects of passion flower, clinical trials into its effects are scarce.[22] Moreover, there is little information about the effects of aromatherapy massage using passion flower on pain and a review study highlighted that more clinical trials are necessary to determine its analgesic effects.[23] Besides, few studies have so far evaluated the effects of aromatherapy massage on postoperative pain among patients with CABG surgery. Therefore, the question is whether aromatherapy massage with sesame oil or passion flower essential oil has different effects on postoperative pain in patients undergoing CABG surgery.

Objectives

The aim of this study was to compare the effects of aromatherapy massage with passion flower and sesame essential oils on postoperative pain intensity among patients with CABG surgery.

Methods

Study design and participants

This double-blind randomized parallel trial was conducted from November 2019 to April 2020. Participants were sixty patients with CABG surgery recruited from the intensive care units and cardiac surgery wards of Chamran teaching hospital affiliated to Isfahan University of Medical Sciences, Isfahan, Iran. Inclusion criteria were age of 18–70 years, complete consciousness, ability to speak, stable hemodynamic status, no allergy to passion flower and sesame essential oils, a pain score of more than 3 for the pain visual analogue scale at the time of recruitment, and no olfactory problem, chronic musculoskeletal pain, sensory or motor disorders, mental illness, and menopausal hot flashes.[25] Development of any serious hemodynamic instability or life-threatening dysrhythmia was considered as exclusion criterion.

Sample size was estimated based on the findings of a previous study, where the effect of massage therapy on pain in cardiac surgical patients was assessed. At the end of the study, the mean pain intensity decreased by an average of 2.3±2.44 and 0.4±1.45 points in the intervention and control groups, respectively.[27] Therefore, with a type I error of 0.05, a type II error of 0.1, μ_1 *of* 2.3, μ_2 *of* 0.4, S_1 of 2.44, and S_2 of 1.45, the needed sample size in each group was estimated to be 24. However, sample size was increased to 30 per group considering possible withdrawals.

During the study period, 94 patients with CABG surgery were assessed for eligibility, 34 patients excluded, 20 patients not meeting inclusion criteria and 14 patients declined to participate in the study. The remaining 60 patients were randomly allocated to passion flower group (group A) and sesame group (group B) through random allocation. To this end, 30 cards labeled 1 and 30 cards labeled 2 were randomly put in opaque envelopes and each participant was asked to randomly select one card. Participants with cards labeled 1 were allocated to group A and participants with cards labeled 2 were allocated to group B. All participants and massage therapists were blind to group allocation [Figure 1].

Data collection instruments

Instruments were a demographic questionnaire and a pain visual analogue scale. The items of the demographic questionnaire were on gender, age, marital status, and employment status. The visual analogue scale was a ten-centimeter horizontal line with "No pain" (score 0) at the left end and "Severe pain" (score 10) at the right end. Participants were asked to rate their pain by putting a "×"

sign on the line and then, their pain score was determined using a ten-centimeter ruler. Scores 0–3, 4–7, and 8–10 were interpreted as mild pain, moderate pain, and severe pain, respectively.[28]

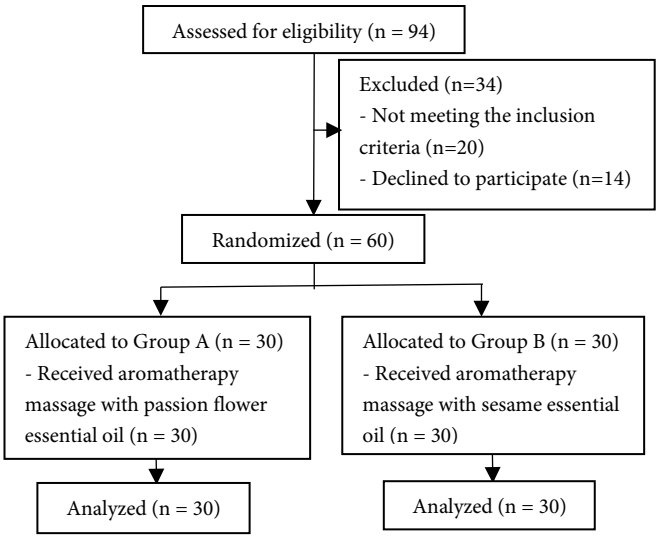

Figure 1. The CONSORT flow diagram of the study

Preparation of essential oils

The essential oils of passion flower (20%) and sesame (59% linoleic acid) were supplied by the Barij Essence Pharmaceutical Company, Kashan, Iran (with a quality certificate of ISO 45001: 2018). The concentration of the essential oils was determined based on the existing literature and through consultation with a herbalist.[29] Passion flower and sesame essential oils were prepared in bottles with the same shape and color and the bottles were coded as drug A and drug B.

Intervention

Before the intervention, participants in groups A and B were tested for allergy to passion flower and sesame oils, respectively. Allergy testing was performed through placing one drop of the intended essential oil on the internal surface of the wrists and the site was immediately dressed to reduce the inhalation of the oil smell. After 15 to 20 minutes, participants were assessed for the symptoms of allergy, namely inflammation, redness, itching, and burning sensation. Moreover, participants were asked to report any symptom of allergy developed during the first 24 hours after allergy testing. None of the participants had allergy to the essential oils.

Study intervention was aromatherapy massage with passion flower essential oil for group A and sesame essential oil for group B. It was provided to female participants by the first author and to male participants by a male research assistant. Both therapists had received massage therapy training from a massage therapy specialist and had received massage therapy certificate from Iran Technical and Vocational Training Organization. Aromatherapy massage was provided using the Swedish effleurage technique for twenty minutes applied with the gentle pressure of the therapist's palm to the legs (soles, feet, and the quadriceps muscles), upper limb (from hands to the shoulder), and the upper and lower back (at the both sides of the vertebrae). Two milliliters of essential oil were used for each area. The effleurage technique consists of gentle pressure towards the distal area and is supposed to improve blood circulation, warm the muscles, and promote physical and mental relaxation.[29] The intervention was performed once daily for four consecutive days in the second to the fifth postoperative days between 19:00 and 21:00, i.e., at least two hours before sleep. During massage therapy, therapist's hands were in continuous contact with participant's skin and the excess essential oil on the skin was removed using a cotton swab. A clinical nurse from the study setting who was blind to the study groups performed pain assessment before and thirty minutes after each aromatherapy massage session. All participants in both groups received routine postoperative analgesics.

Ethical considerations

The Ethics Committee of Isfahan University of Medical Sciences, Isfahan, Iran, approved this study (code: IR.MUI.RESEARCH.REC.1398.295) and the study was registered in the Iranian Registry of Clinical Trials (code: IRCT20191026045249N1). At the beginning of the study, we provided all participants with explanations about the study aim, ensured them that they would receive routine postoperative analgesics, and informed them about the confidentiality of their data and their right to voluntarily participate in or withdraw from the study. Participants received the study intervention from a same-gender therapist. All participants signed the informed consent before participation.

Data analysis

The SPSS software (v. 16.0, SPSS Inc., Chicago, IL, USA) was used for data analysis. Normality was tested via the Kolmogorov-Smirnov test. Between-group comparisons were made using the Chi-square test for categorical variables and the independent-sample t test. The level of significance was set at less than 0.05.

Results

In total, sixty patients participated in this study and all of

them completed the study [Figure 1]. Most participants were female (70%), married (75%). There were no significant differences between the groups in terms of participants' demographic characteristics, namely age, gender, marital status, and employment status (P>0.05) [Table 1].

The results of the independent-sample *t* test revealed significant difference between the two groups respecting the mean score of pain in all intervention days (P<0.01) except for the second day (P>0.01). Although both the pretest and the posttest mean scores of pains significantly decreased in both groups across the four measurement time points (P<0.0001), the amount of decrease in the passion flower oil group was significantly more than in the sesame oil group at the third and the fourth time points (P<0.0001) [Table 2].

Table 1. Participants' demographic characteristics

Characteristics		Groups [a]		P value
		Passion flower oil	Sesame oil	
Age (Years)		54.4±6.93	59.2±7.18	0.903[b]
Gender				
	Male	11 (36.7)	7 (23.3)	0.26[c]
	Female	19 (63.3)	23 (76.7)	
Marital Status				
	Single	7 (23.3)	8 (26.7)	0.766[c]
	Married	23 (76.7)	22 (73.3)	
Employment status				
	Housekeeper	9 (30)	7 (23.3)	
	Unemployed/retired	10 (33.3)	14 (46.7)	0.572[c]
	Employed	11 (36.7)	9 (30)	

[a] Data presented as Mean±SD or N (%), [b] Independent-samples *t* test; [c] Chi-square test

Table 2. Within- and between-group comparisons respecting the mean score of pain intensity

Time	Groups [a]		P value [c]	The amount of pain reduction		P value [b]
	Passion flower oil	Sesame oil		Passion flower oil	Sesame oil	
First day	8.03±0.8	7.23±1.38	0.028	-0.8±0.55	-0.97±0.67	0.321
Second day	6.57±0.73	6.3±1.32	0.83	-1.53±0.5	-1.17±0.87	< 0.088
Third day	5±0.45	5.8±1	<0.0001	-2.4±0.67	-1.43±1	< 0.0001
Fourth day	4.43±1.19	5.4±1.1	<0.0001	-2.7±0.91	-1.43±0.57	< 0.0001
P-Value [b]	<0.0001	<0.0001				

[a] Data presented as Mean±SD, [b] The results of the independent-sample *t* test; [c] The results of the Friedman's test

Discussion

The results of this study showed that aromatherapy massage with both passion flower and sesame essential oils significantly reduced postoperative pain intensity among patients with CABG surgery. However, the amount of pain reduction in the passion flower group was significantly more than the sesame group. Proper massage therapy not only blocks pain signals, but also reduces tissue hypoxia through reducing muscle spasms. Moreover, it stimulates the nervous system to increase the secretion of endorphins and serotonin and thereby, increases pain threshold and reduces pain perception.[30]

Our findings showed that aromatherapy massage with sesame essential oil was effective in significantly reducing pain intensity. In agreement with our findings, experimental animal models showed that sesame essential oil can exert analgesic effects.[31] The results of a study on patients with upper and lower extremities traumas also showed that the topical application of sesame essential oil significantly reduced pain severity and frequency.[32] Sesame essential oil is extracted from *Sesamum indicum L.* that belongs to the *Pedaliaceae* family, and has anciently been used in the traditional medicine of Iran and many other countries due to its significant anti-bacterial,[33] antioxidant, anti-inflammatory,[33,34] anti-mutagenic, anti-pyretic, and antinociceptive effects.[34] In Taiwanese traditional medicine, sesame essential oil is used to relieve pain in patients with joint pain, toothache, premenstrual syndrome, and sharp injuries.[31]

We also found the significant positive effects of

aromatherapy massage with passion flower essential oil on pain intensity. In consistence with this finding, a study indicated that passion flower can be effective in treating neuropathic pain probably through opioidergic and GABAergic mechanisms.[35] Studies using other essential oils also reported their significant positive effects on pain. For example, a study noted that massage therapy using aromatic oils reduced pain.[36] Another study showed that massage therapy using aromatic oils had significant positive effects on pain intensity among patients with multiple sclerosis.[37] Similarly, a study found that aromatherapy massage was effective in significantly reducing pain intensity among patients with percutaneous coronary interventions and its effects lasted at least for two hours.[38] Moreover, a study found that aromatherapy massage with lavender essential oil significantly reduced pain after cesarean section.[25] Two studies also found that aromatherapy massage significantly reduced neuropathic pain intensity among patients with diabetes mellitus[24] and pain intensity among patients with burn injuries.[24]

As aromatherapy massage was used in both groups, it was impossible to determine which component of the intervention (aromatherapy or massage) reduced postoperative pain. Therefore, clinical trials with crossover designs are needed to compare the effects of these components. The necessity to put patients with a surgical incision on the chest in prone position for back massage was a main limitation of this study. We attempted to manage this limitation by performing back massage in sitting position with a pillow in front of the chest for patients who reported discomfort in prone position. Moreover, the large environment of the study setting made it difficult for the first author to monitor all participants. This limitation was managed using a research assistant for data collection. Another limitation of the study was the lack of a control group. Besides, the study was conducted on postoperative pain among patients with CABG surgery and its findings may not freely be generalizable to patients with other types of pain. Hence, controlled trials on different populations of patients with postoperative pain are needed to produce firmer evidence regarding the effects of aromatherapy massage on different types of acute and chronic pain such as cancer pain, arthritis pain, and low back pain.

Conclusions

This study concludes that aromatherapy massage with passion flower essential oil is more effective than aromatherapy massage with sesame essential oil in reducing postoperative pain intensity among patients with CABG surgery. Therefore, aromatherapy massage can be used as a simple and inexpensive intervention to reduce postoperative pain. The results of this study pave the way for further studies into the effects of aromatherapy massage. Nurses in different surgical wards can use aromatherapy massage in adjacent to pharmacological modalities in order to manage postoperative pain.

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Competing interests

The authors declare that they have no competing interests.

Abbreviations

Coronary artery bypass grafting: CABG.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Role of the funding source

None.

Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The Ethics Committee of Isfahan University of Medical Sciences, Isfahan, Iran, approved this study (code: IR.MUI.RESEARCH.REC.1398.295) and the study was registered in the Iranian Registry of Clinical Trials (code: IRCT20191026045249N1). All participants signed the informed consent for at the beginning of the study.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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