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Aromatherapy massage versus reflexology on female elderly with acute coronary syndrome

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ABSTRACT

Background: Fatigue and abnormalities in cardiovascular parameters are recognized as major problems for patients with acute coronary syndrome. Non-pharmacological nursing interventions are useful for controlling this fatigue and reducing patients' suffering during hospitalization.

Aim: The present study compared the effects of aromatherapy massage and reflexology on fatigue and cardiovascular parameters in older female patients with acute coronary syndrome.

Design: This study was a randomized clinical trial.

Methods: The study was conducted with 135 older female patients with acute coronary syndrome who were hospitalized in a cardiac care unit in 2014. They were invited to participate in the study and then were randomly divided into three groups: 'aromatherapy massage', 'reflexology' and 'control'. The fatigue severity and cardiovascular parameters were assessed using the Rhoten fatigue scale and a checklist. Measurements in the groups were performed before and immediately after the intervention. Data analysis was performed using descriptive and analytical statistics via the SPSS software.

Results: Aromatherapy massage significantly decreased fatigue, systolic blood pressure, mean arterial pressure and O_2 saturation more than the reflexology intervention. However, reflexology reduced patients' heart rates more than an aromatherapy massage ($P < 0{\cdot}05$). Moreover, no significant changes were observed in patients' diastolic blood pressures when compared to the control group ($P = 0{\cdot}37$).

Conclusions: Implementation of both aromatherapy massage and reflexology has positive effects on the fatigue and cardiovascular parameters of patients with acute coronary syndrome. However, aromatherapy massage can be more beneficial to use as a supportive approach in coronary diseases.

Relevance to clinical practice: The need for reducing fatigue in acute coronary syndrome (ACS) patients in a cardiac care unit is evident. The implementation of aromatherapy massage and reflexology had positive effects on patients' fatigue as related to both physical and mental health.

Key words: acute coronary syndrome • alternative therapies • aromatherapy • cardiovascular parameters • fatigue • reflexology

INTRODUCTION

Fatigue is one of the most common and distressing symptoms in patients with acute coronary syndrome (ACS), often impeding patients' active lifestyle (Pelletier *et al.*, 2015; Shlomai *et al.*, 2015). The progression of fatigue may negatively affect ACS and exaggerate this disease (Franssen *et al.*, 2003; Eckhardt *et al.*, 2014). Moreover, fatigue alters patients' autonomic nervous activities and may lead to abnormalities in cardiovascular parameters (Silverman *et al.*, 2010; Fagundes *et al.*, 2011). In addition, fatigue is a poorly understood phenomenon in health care settings that often requires a multidisciplinary approach for management (Ozdemir *et al.*, 2013).

Despite the use of various medications for symptom relief in patients with ACS, pharmacological modalities may not be able to comprehensively address these symptoms, including fatigue (Peuckmann-Post *et al.*, 2010; Fake *et al.*, 2016). Complementary and alternative medicine (CAM) services may be the most powerful therapeutic interventions in patients with cardiovascular diseases (Yeh *et al.*, 2006).

Aromatherapy is a holistic intervention applied through inhalation or massage (Bikmoradi *et al.*, 2015; Karadag *et al.*, 2015; Seyyed-Rasooli *et al.*, 2016). Aromatherapy massage consists of the use of essential oil, extracted from the vapour of the volatile essence of plants, through massage. Lavender (*Lavandula angustifolia*) is widely used in different contexts (Field *et al.*, 2007;

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Hosseini *et al.*, 2016). Previous studies have confirmed the sedative effects of lavender on the parasympathetic system. Also, it has been found that lavender promotes heart function and coronary blood flow (Shiina *et al.*, 2008; Lytle *et al.*, 2014; Bikmoradi *et al.*, 2015). Tisserand (1988) suggested that lavender may have a similar function to the benzodiazepines and can promote the effects of gamma-amino-butyric acid in the amygdala (Tisserand, 1988).

Several studies reported that lavender resulted in reduced fatigue in different groups (Kang and Kim, 2002; Bahraini *et al.*, 2011). For instance, in randomized controlled studies, Balouchi *et al.* (2016) and Chen and Chen (2015) found that aromatherapy with lavender significantly decreased fatigue (Chen and Chen, 2015; Balouchi *et al.*, 2016). Tahmasebi *et al.* (2015) in a quasi-experimental clinical trial also stated that lavender alleviated cardiovascular parameters in cardiovascular patients (Tahmasebi *et al.*, 2015).

Another complementary therapy approach with a potential beneficial effect for reducing fatigue is reflexology (Ozdemir *et al.*, 2013). Reflexology is an ancient practice using the thumb and fingers on hands, feet and ears and stimulating some areas called reflex zones. A reflex zone corresponds with an organ, gland or body parts and is proposed to help with the body's self-improvement (Pitman and Mackenzie, 2002; Wang *et al.*, 2008; Ozdemir *et al.*, 2013). Reflexologists claim that massage pressure on the reflex zone increases blood supply to the corresponding organ associated with the area being massaged (Jones *et al.*, 2013). Reflexology is useful for managing the adverse physical and psychological symptoms of a disease and its treatment process and reducing fatigue (Yang, 2005; Wang *et al.*, 2008). A randomized controlled trial reported that reflexology significantly decreased patients' fatigue after eight reflexology sessions (Unal and Balci Akpinar, 2016). However, another randomized controlled trial study, with healthy volunteers, demonstrated that reflexology did not affect cardiovascular parameters (Jones *et al.*, 2012).

A review of the literature identified a lack of research investigating the effects of these modalities on patients with ACS. The aim of this study was to compare the effects of aromatherapy massage and reflexology on fatigue and cardiovascular parameters in older female patients with ACS.

MATERIALS AND METHODS

Design

This randomized controlled trial included 135 female older patients with an ACS who were assigned to one of three groups: (1) reflexology ($n = 45$); (2) aromatherapy massage ($n = 45$) and (3) a control group ($n = 45$). The primary outcome measures were the effects of reflexology and aromatherapy massage on patient-reported fatigue and their cardiovascular parameters before treatment and after the treatment (Figure S1, Supporting Information).

Setting

The participants were recruited from high-turnover coronary care units (CCU) of a large tertiary referral teaching hospital in an urban area of Iran between July 2014 and December 2015. This study was approved by the Ethical Commission affiliated with a University, Tehran, Iran. In addition, the study was registered in the Iranian Registry of Clinical Trials (code: IRCT201512027529N8). Ethical approval was obtained from Shahed University Review Board (No. 41-228111). The study was conducted in accordance with the ethical principles provided by the Declaration of Helsinki and the guidelines of the Iranian Ministry of Health and Medical Education. The aim and the method of the study were explained to each patient, and an informed verbal consent form was signed by those who agreed to take part in this study. The confidentiality and anonymity of the participants were ensured by using code numbers instead of names. Patients could also withdraw from the study at any time without penalization.

Sample

All patients with ACS hospitalized in the CCU were invited to take part in the study on the first day of their admission.

Sample size

In order to demonstrate a significant difference between the aromatherapy massage and reflexology groups, the sample size was determined through the following process. Given the sample size in a previous study, $\alpha = 0{\cdot}05$, $\beta = 90\%$ $p =$ time, correlation in this study was intended to be $= 0{\cdot}5$, $\sigma = 8{\cdot}73$, $n =$ the number of groups $= 3$, s2/x = variance, the time intervention $= 0{\cdot}06$ h and $d =$ three estimated mean differences before and after the intervention $= 6{\cdot}01$. $N = 2 \times (1{\cdot}96 + 1{\cdot}28)\text{^}2 \times ((1 - 0{\cdot}5) \times 8{\cdot}73\text{^}2) / (3 \times 0{\cdot}06 \times 6{\cdot}01\text{^}2) = 133{\cdot}05 \approx 135$. Therefore, the number of patients in each group was 45 patients (Mahmoudirad *et al.*, 2014).

Randomization

Following receipt of a university's ethical committee approval, and obtaining the health care organization's permission to conduct the study in the CCU, the nurse manager was informed of the study's purpose and inclusion criteria to help with the identification of eligible participants. A convenience sample of older female patients, who met the inclusion criteria, was chosen, with no patient declining to participate. The allocation of the patients to the groups was conducted randomly through a system of sealed envelopes, with each envelope assigned to a specific group. The sampling process continued until the required number of the participants was recruited to each group (Figure 1). In order to avoid bias, one researcher generated the random allocation process, and a different researcher enrolled the patients and assigned the patients to groups.

It was noted that the second author generated the random allocation sequence, and the first author enrolled the patients and assigned participants to interventions.

Blinding

It was impossible to control the patients' or nurses' awareness of the group assignment due to the nature of the intervention (aromatherapy massage) and lavender smell. Nevertheless, the data analyst was unaware of the group assignment. In addition, the randomization code was available only to a research fellow who was not connected to this study. The code was disclosed to the researchers after the statistical data analysis was completed.

Eligibility criteria

Inclusion criteria. The inclusion criteria were patients who: were female; were diagnosed with ACS; were 60 years or older (Zaninotto *et al.*, 2016); had received no

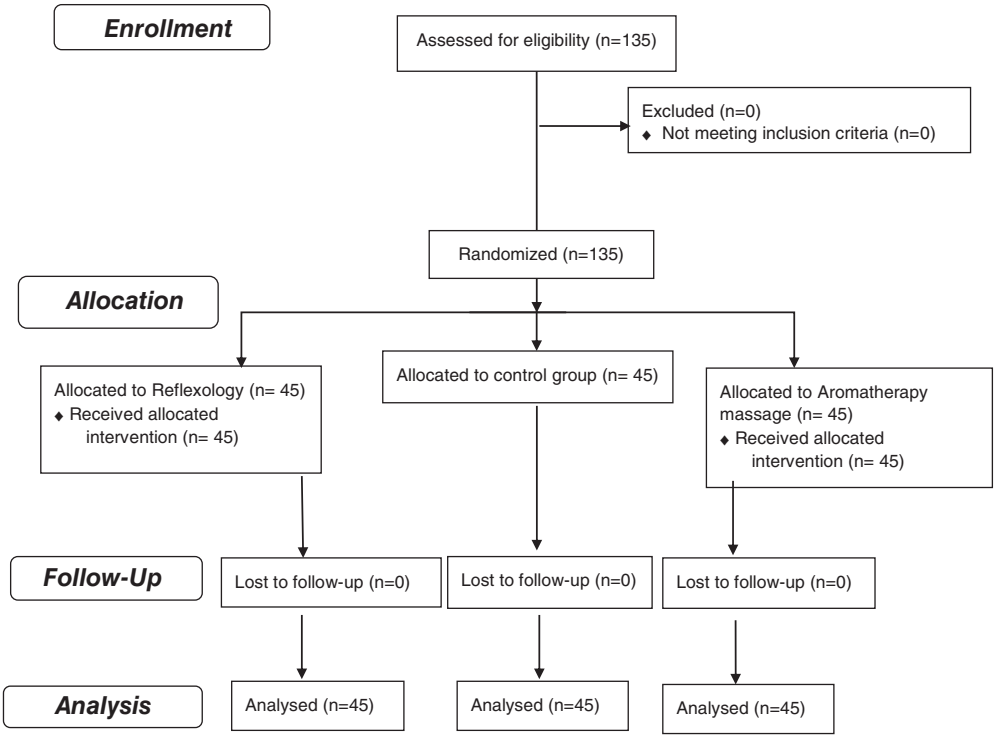

Figure 1 The process of the study according to the Consort flow diagram (2010).

anxiolytics or sedative drugs in the last 4 h; had received no alternative or complementary health care services in the last 48 h; did not have foot ulcers; had no history of drug addiction, asthma, eczema or allergy; and had passed the olfactory test and the abbreviated mental test (score ≥ 7).

Exclusion criteria. Patients who had severe haemodynamic instability (according to physicians' orders) during the intervention or unwillingness to continue with the study were excluded from the study.

Interventions and control groups

Control group

The patients in the control group received the usual care in the CCU.

Reflexology group

Reflexology, the stimulation of specific zones on the feet associated with different organs, based on the Ingham method of reflexology, was administered to the reflexology intervention group (Byers, 2004). The researcher, qualified to administer reflexology, performed the intervention in the morning shift once the patients were comfortable in a bed in the supine position. Nursing and medical professionals were instructed not to disturb the patient during the intervention or the rest period unless it was necessary. Furthermore, the patients were asked to refrain from speaking during the intervention unless it was necessary and focus on feeling the sensations of their body and expressing those feelings as this process could help the intervention. A pillow was placed under the patients' knees to facilitate the massage. The investigator washed her hands with warm water and performed a general foot massage with six drops of almond oil used on each foot. Relaxation techniques used for loosening the foot and preparing it for reflexology included effleurage movements (10 times), stretching toes by holding them between thumbs and other fingers (5 times in both directions) and moderate rotational movements around the ankle (5 times).

Afterwards, systematic reflexology focusing on the reflex zones corresponding to the patients' solar plexus (14 s), pituitary gland (40 s), brain (5 s), heart (10 s), intestines (5 s), vertebral column (5 times), adrenal gland and kidney (5 times) were performed. These actions were performed using a firm downward pressure of the thumb and rubbing movements for stimulating the intestines and kidneys. Prior to, and after, the reflexology intervention, the patient's levels of anxiety, depression and cardiovascular parameters were assessed. The total duration of the reflexology intervention was 20 min. The timing of the intervention was flexible. However, the intervention was conducted during the morning as the patients collaborated more easily, and the visit did not appear to disturb them.

Aromatherapy massage group

The aromatherapy massage, using lavender essential oil, consisted of linalool (27·11%) and linalyl acetate (23·33%) acetate. Essential oil was formulated in the ratio of 3:3:2:2 mL in 100 mL of coconut carrier oil. Lavender essential oil was chosen through consultation with a Department of Pharmacognosy. Reflexology, with 10 drops of the essential lavender oil, formed the aromatherapy massage. The massage oil was applied to each foot (total 20 drops) on the same reflex zones as the reflexology group. The total duration of the aromatherapy massage lasted for 20 min. It should be noted that no identified side effects or risk factors with regards to the intervention and lavender oil were reported (Molavi Vardanjani *et al.*, 2013; Hashemi *et al.*, 2015).

Measures

The demographic and medical information form

The demographic questionnaire included items related to age, marital status, employment status, educational level, living status and history of hospitalization.

Cardiovascular parameters

The systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MBP), heart rate (HR), respiratory rate (RR) and O_2 saturation (SpO_2) data were measured using a standard and calibrated monitoring machine.

The Rohten fatigue scale (RFS)

The Rohten fatigue scale (RFS) consisted of a 10-cm line with extremely positive statements on one end and extremely negative statements on the other end. The most positive and negative fatigue statements were scored 0 and 10, respectively. Based on the use of a visual analogue scale (VAS), the ratings of this line included 0 (lack of fatigue), 1–3 (low fatigue), 4–6 (moderate fatigue), 7–9 (high fatigue) and 10 (severe fatigue) (Adaryani *et al.*, 2007).

Abbreviated mental test (AMT)

The abbreviated mental test (AMT) enabled the researchers to rapidly identify patients with cognitive disorders. Patients with a score of greater than 7 of 10 were considered normal. Patients with a score lower than seven were identified as having a cognitive impairment (Faraji *et al.*, 2013). In terms of reliability, Cronbach's alpha coefficient of the AMT was reported as 0·76 (Bakhtiyari *et al.*, 2014).

Data collection

After patients were allocated to one of the three research groups (aromatherapy massage, reflexology or control), the RFS and the cardiovascular parameters checklist were completed by a nurse before and immediately after the intervention for all groups.

Data analysis

Statistical procedures

Data analysis used descriptive statistics (frequency, percentage, mean and standard deviation) and inferential statistics (one-way ANOVA, χ^2 test, Tukey's, Cramer's and Phi test and Cohen's *d*-test). A χ^2 test was used to assess whether there were any significant differences between the fatigue reported by the patients in each group. Cardiovascular parameters, using one-way ANOVA and least significant difference (LSD), were assessed to determine the between-group effects of the interventions. The Eta correlation ratio was used to examine the relationship between the rating scale and the interventions, but the pair-wise comparisons were performed using Cohen's *d*-test. Cramer's and Phi correlation ratio examined the relationship between the interventions and fatigue. In addition, the Kolmogorov-Smirnov test examined the normal distribution of the data, while Leven's test was used to report the homogeneity of the variance. The alpha was set at $p < 0{\cdot}05$. Data were analysed using the SPSS software (SPSS Inc., Chicago, IL, USA).

RESULTS

The demographic characteristics of the participants

A total of 135 patients met the inclusion criteria and were randomized into the three groups ($n = 45$ per group). The study population had a mean age of $72{\cdot}78 \pm 7{\cdot}65$ years. The ANOVA and χ^2 test showed no statistically significant differences between the groups in terms of age, marital status, employment status, educational level, living status and history of hospitalization (Table S1).

Fatigue

Significant differences were reported in the levels of fatigue between the patients in the control and the intervention groups ($x^2 = 51{\cdot}262$, $p = 0{\cdot}001$). Most of the patients (63%, $n = 85$) reported severe levels of fatigue. However, after the interventions, 42·2% ($n = 57$) reported only moderate fatigue. The pair-wise comparison of the groups revealed that both intervention groups showed a reduction of the levels of fatigue ($p = 0{\cdot}001$). However, Crammer's and phi test indicated a larger effect of aromatherapy massage on the reduction of the level of fatigue as compared with the reflexology intervention ($\Phi = 0{\cdot}67$) (Table 1).

Cardiovascular parameters

Systolic blood pressure

The results of the ANOVA test showed a significant reduction of the SBP ($p = 0{\cdot}01$). There was a direct correlation between the SBP and the interventions ($\eta^2_p = 0{\cdot}065$). The result of Tukey's test revealed that aromatherapy massage was responsible for this SBP reduction ($p = 0{\cdot}005$), and Cohen's *d* identified a medium effect for this intervention ($d = 0{\cdot}58$).

Diastolic blood pressure

The results of the ANOVA test showed that there was no significant reduction in DBP ($p < 0{\cdot}98$).

Heart rate

An ANOVA test identified a significant reduction in patients' HRs ($p = 0{\cdot}01$). Also, there was a direct correlation between the patients' HRs and the interventions ($\eta^2_p = 0{\cdot}062$). Tukey's test revealed that the reflexology intervention was responsible for the HR reduction ($P = 0{\cdot}01$), with Cohen's *d* identifying a medium effect for this intervention ($d = 0{\cdot}65$) (Table 2).

Respiration rate

Based on an ANOVA, a significant reduction was identified in the patients' RRs ($p = 0{\cdot}04$). Moreover, there was a direct correlation between the patients' RRs and the interventions ($\eta^2_p = 0{\cdot}079$). Tukey's test revealed that both the aromatherapy massage and the reflexology intervention decreased the patients' RRs ($p < 0{\cdot}05$), with Cohen's *d* identifying a medium effect of this reduction ($d = 0{\cdot}62$, $d = 0{\cdot}50$) (Table 2).

Oxygen saturation

A significant reduction in the patients' SpO_2s ($p = 0{\cdot}001$) was identified through an ANOVA. Also, there was a direct correlation between the patients' RRs and the interventions ($\eta^2_p = 0{\cdot}107$). Tukey's test identified that the aromatherapy massage intervention could decrease the patients' SpO_{2s} ($p = 0{\cdot}01$), while Cohen's *d* identified the associated large effect ($d = 1{\cdot}04$) (Table 2).

Mean arterial pressure

An ANOVA identified a significant reduction in the patients' MAPs ($p = 0{\cdot}04$). There was also a direct correlation between the patients' MAPs and the interventions ($\eta^2_p = 0{\cdot}080$). Based on the results of Tukey's test, the aromatherapy massage intervention was responsible for the patients' MBPs reduction ($P = 0{\cdot}01$), with Cohen's *d* identifying a medium effect ($d = 0{\cdot}58$) (Table 2).

Table 1 The comparison of the fatigue severity before and after the interventions

Parameters	Group	Low	Moderate	High	Severe	Total	χ^2	df	Sig.*	Cramer's Phi†
Fatigue before the intervention	Control	2 (4·4%)	10 (22·2%)	8 (17·8%)	25 (55·6%)	45 (100%)	4·061	6	0·668	
	Reflexology	1 (2·2%)	9 (20%)	6 (13·3%)	29 (64·4%)	45 (100%)				
	Aromatherapy massage	0 (0)	10 (22·2%)	4 (8·9%)	31 (68·9%)	45 (100%)				
	Total	3 (2·2%)	29 (21·5%)	18 (13·3%)	85 (63%)	135 (100%)				
		No fatigue	Low	Moderate	High	Severe	Total	χ^2	df	Sig.	
Fatigue after the intervention	Control	3 (6·7%)	9 (20%)	8 (17·8%)	9 (20%)	16 (35·6%)	45 (100%)	51·262	8	0·001	$\Phi = 0{\cdot}62$ $\Phi c = 0{\cdot}44$
	Reflexology	2 (4·4%)	11 (24·4%)	24 (53·3%)	6 (13·3%)	2 (4·4%)	45 (100%)				
	Aromatherapy massage	0 (0%)	20 (44·4%)	25 (55·6%)	0 (0%)	0 (0%)	45 (100%)				
	Total	5 (3·7%)	40 (29·6%)	57 (42·2%)	15 (11·1%)	18 (13·3%)	135 (100%)				
Fatigue after the intervention	Control	3 (6·7%)	9 (20%)	8 (17·8%)	9 (20%)	16 (35·6%)	45 (100%)	19·889	4	0·001	$\Phi = 0{\cdot}47$ $\Phi c = 0{\cdot}47$
	Reflexology	2 (4·4%)	11 (24·4%)	24 (53·3%)	6 (13·3%)	2 (4·4%)	45 (100%)				
Fatigue after the intervention	Control	3 (6·7%)	9 (20%)	8 (17·8%)	9 (20%)	16 (35·6%)	45 (100%)	40·930	4	0·001	$\Phi = 0{\cdot}67$ $\Phi c = 0{\cdot}67$
	Aromatherapy massage	0 (0%)	20 (44·4%)	25 (55·6%)	0 (0%)	0 (0%)	45 (100%)				

LSD, least significant difference.

*P-values indicated significant of the differences between the groups using the χ^2 test. Also, the pair-wise comparison was performed using Tukey's LSD test.

†Cramer's Phi correlation ratio was used to report correlations between interventions and fatigue severity.

Table 2 The comparison of the cardiovascular parameters before and after the interventions

Cardiovascular indicators	Group	Baseline M ± SD	Post-interventions M ± SD	Baseline p-value (between groups)*	Post-interventions p-value (between groups)	ES η^2_p†	Post-test (LSD)	Cohen's d effect seize‡
SBP	Control	128·42 ± 18·83	126·89 ± 19·15	0·85	0·01	0·065	(Control, Reflexology) 0·510	(Control, Aromatherapy massage) $d = 0{\cdot}58$ $r = 0{\cdot}28$
	Reflexology	127·76 ± 12·99	124·80 ± 13·89				(Control, Aromatherapy massage) 0·005	
	Aromatherapy massage	129·51 ± 11·66	117·78 ± 10·76					
DBP	Control	75·67 ± 12·10	76·20 ± 12·23	0·05	0·37			
	Reflexology	75·87 ± 12·15	73·76 ± 11·72					
	Aromatherapy massage	81·20 ± 11·76	73·13 ± 8·65					
MAP	Control	94·33 ± 16·34	93·78 ± 16·42	0·57	0·04	0·08	(Control, Reflexology) 0·94	(Control, Aromatherapy massage) $d = 0{\cdot}64$ $r = 0{\cdot}31$
	Reflexology	97·11 ± 15·34	94·69 ± 16·25				(Control, Aromatherapy massage) 0·01	
	Aromatherapy massage	94·63 ± 7·94	85·60 ± 7·18					
HR	Control	80·36 ± 8·80	79·96 ± 8·96	0·07	0·01	0·062	(Control, Reflexology) 0·01	(Control, Reflexology) $d = 0{\cdot}65$ $r = 0{\cdot}31$
	Reflexology	77·16 ± 13·72	73·60 ± 10·47				(Control, Aromatherapy massage) 0·25	
	Aromatherapy massage	74·82 ± 11·74	76·53 ± 11·19					
RR	Control	15·18 ± 4·06	15·18 ± 3·64	0·19	0·04	0·079	(Control, Reflexology) 0·005	(Control, Reflexology) $d = 0{\cdot}62$ $r = 0{\cdot}30$
	Reflexology	15·64 ± 1·81	17·04 ± 2·17				(Control, Aromatherapy massage) 0·03	(Control, 3) $d = 0{\cdot}50$ $r = 0{\cdot}25$
	Aromatherapy massage	18·00 ± 2·34	16·69 ± 2·29					
SpO_2	Control	89·80 ± 4·11	89·82 ± 4·14	0·1	0·001	0·107	(Control, Reflexology) 0·06	(Control, Aromatherapy massage) $d = 0{\cdot}50$ $r = 0{\cdot}25$
	Reflexology	91·22 ± 4·01	92·09 ± 3·90				(Control, Aromatherapy massage) 0·01	
	Aromatherapy massage	91·20 ± 2·40	92·51 ± 1·81					

DBP, diastolic blood pressure; HR, heart rate; LSD, least significant difference; RR, respiratory rate; SBP, systolic blood pressure; MAP, mean arterial pressure; SpO_2, O_2 saturation.

*Data were presented as means ± standard deviation. P-values indicated the difference between the groups using one-way ANOVA using the equality of variance. The pair-wise comparison of the groups was conducted using Tukey's LSD test.

†The Eta correlation ratio was used to report the correlation between interventions and cardiovascular parameters.

‡Cohen's d represented the effect size of the interventions on cardiovascular parameters.

DISCUSSION

This study was conducted with the aim of comparing the effects of aromatherapy massage and reflexology on the fatigue and cardiovascular parameters in older female patients with ACS. The results of this study demonstrated that aromatherapy massage and reflexology had more effects on fatigue and cardiovascular parameters, with the exception of DBPs, as compared with a control group. Moreover, both interventions decreased fatigue severity in patients with ACS, but this reduction was greater in the aromatherapy massage group. The combination of aromatherapy massage and lavender essential oil appeared to accelerate the removal of catabolites and fortified the heart (Nunes *et al.*, 2016).

Similar to the current study, a previous study also identified that aromatherapy massage, administered to middle-aged female patients, also reduced their fatigue (Kim and Kim, 2012). In addition, Fellowes *et al.* (2004) stated that aromatherapy massage reduced fatigue in patients with cancer (Fellowes *et al.*, 2004). In contrast, findings of a long-term randomized controlled trial by Gok Metin and Ozdemir (2016) demonstrated that reflexology reduced fatigue earlier than aromatherapy massage. This postponement may be due to the time required for essential oil absorption in inflamed joints (Ozdemir *et al.*, 2013; Gorji *et al.*, 2015; Gok Metin and Ozdemir, 2016).

The comparison of the patients' cardiovascular parameters before and after the intervention demonstrated that aromatherapy massage reduced patients' RRs and had a greater effect on controlling patients' SpO_2s. However, patients' DBPs showed no changes with either of the intervention groups. Reflexology seemed to have a greater effect on reducing patients' HR, while aromatherapy massage better controlled patients' SBP, MAP and SpO_2 rather than reflexology.

Eguchi *et al.* (2016) reported that aromatherapy foot massage decreased patients' SBPs and DBPs. Furthermore, Hur *et al.* (2007) achieved the same results among climacteric women (Hur *et al.*, 2007; Eguchi *et al.*, 2016). Yi (2002) reported that patients' SBPs, DBPs and HRs differed significantly between the aromatherapy massage and control groups in pre-surgical patients.

Kaur *et al.* (2012) suggested that three reflexology sessions could significantly decrease patients' SBPs, increase DBPs, reduce HRs and improve SpO_2s. However, no statistically significant differences were found in patients' BPs and HRs (Yi 2002).

Such cardiovascular contradictions may be due to differential response times among individuals and the reflexology locations used, making it difficult for the methods and findings to be reproduced. Possibly, non-specific effects such as the sympathy, verbal and psychological content of the communications between the researcher and the patients during a massage could also have affected the haemodynamic status of an individual organ (Jones *et al.*, 2013).

This study supported the distinction between the effects of aromatherapy massage and the use of essential oil from only massage by using reflexology for both intervention groups. As a result, a more useful intervention has been identified.

Limitation

The difficulty in blinding data collector and patients' to the type of intervention being used could be a potential bias. Also, the homogeneous nature of the samples makes the generalizability of the findings difficult to all patients with ACS.

Recommendation for further research

Few studies have compared the effects of aromatherapy massage and reflexology interventions on patients' fatigue and cardiovascular parameters. Therefore, further studies are needed to identify additional effective non-pharmacological interventions.

Replication research, using the same outcome measures and scales, could lend support to the current findings. Moreover, longitudinal studies could further describe the full impact of the interventions.

Further research could explore the effects of aromatherapy massage and reflexology interventions on the physiologic and psychological symptoms (anxiety, depression and sleep disturbance) following hospitalization for patients with ACS when providing holistic nursing care.

CONCLUSION

The findings of this study confirmed that aromatherapy massage and reflexology interventions could be used as non-pharmacological interventions for managing the fatigue and cardiovascular parameters in older female patients with ACS. Along with routine care, critical care nurses can independently use these non-pharmacological alternative interventions for improving the quality of care delivered to patients.

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SUPPORTING INFORMATION

The following Supporting information is available for this article:

Table S1. The demographic characteristics of the samples.

Figure S1. The process of the study according to the Consort flow diagram (2010).

Additional supporting information may be found online in the Supporting Information section at the end of the article.

WHAT IS KNOWN ABOUT THIS TOPIC

- Coronary diseases are considered the main cause for mortality across the world.
- Acute coronary syndrome (ACS) is a stressful condition, and patients may suffer from fatigue, stress and tension, resulting in a decreased quality of life.

WHAT THIS PAPER ADDS

- Implementation of both aromatherapy massage and reflexology interventions has positive effects on fatigue and cardiovascular parameters in patients with ACS.
- Aromatherapy massage can be more beneficial than reflexology when applied as a supportive approach in patients with ACS.
- Critical care nurses can use aromatherapy massage and reflexology interventions as alternative therapies for relieving ACS patients' fatigue and improving their physiological parameters.

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