



# A Review of Aromatherapy for Cardiovascular Disorders: From Persian Medicine to Current Evidence

Vahid Aliannezhadi<sup>1,2</sup>, Mahdi Alizadeh Vaghasloo<sup>3</sup>, Mansoor Keshavarz<sup>4</sup>, Sajjad Sadeghi<sup>5</sup>, Reza Ilkhani<sup>1,2\*</sup> 

## Abstract

**Objectives:** Cardiovascular disorders are the most common causes of mortality and morbidity worldwide. Complementary medicine reduces the complications related to cardiovascular disorders while improving the quality of life of patients. The aim of this study was to review the effects of aromatherapy on cardiovascular disorders from the perspectives of Persian and modern medicine.

**Methods:** In this review article, information related to Persian medicine was collected by searching through “Comprehensive Library of Traditional and Islamic Medicine” software (Noor Digital Library) using keywords such as “smelling”, “sham”, “lakhlakheh”, “bakhoor”, “heart”, and “dill”. Additionally, to find clinical trials (1994-2019) related to the effect of aromatherapy on cardiovascular disorders, electronic databases such as ISI, Scopus, PubMed, ScienceDirect, and Google Scholar were searched using several keywords including “cardiovascular disorder”, “heart”, “coronary”, “cardiovascular disease”, “cardiac”, “aroma”, and “aromatherapy”.

**Results:** According to Persian medicine references, the heart is the most important organ and gives life to the whole body. Aromatherapy using odorous herbs such as rose, apple, quince, and saffron helps balance the heart temperament and improve cardiovascular disorders through their cardiotoxic, anti-syncope, anti-depressant, and anti-arrhythmic properties.

**Conclusions:** Based on Persian medicine references and recent findings in modern medicine, aromatherapy is an effective approach for relieving cardiovascular disorders. Considering these findings, it is suggested to include aromatherapy as a palliative measure for cardiovascular patients. It is also recommended that more clinical trials derived from Persian medicine references be conducted to value the effectiveness of aromatherapy for treating various cardiovascular ailments.

**Keywords:** Aromatherapy, Cardiovascular disorders, Persian medicine, Current evidence

## Introduction

Cardiovascular disorders are the most common non-infective causes of disease with high mortality rates (1). The incidence of cardiovascular disorders has increased in recent years due to increased life expectancy, along with changes in lifestyle and eating habits (2). There are various treatment methods with pharmacological management and coronary artery bypass graft having serious side effects, as well as a huge financial burden on the healthcare system (3). Cardiovascular patients can have various physical and psychological problems. Sleep disturbances, anxiety, depression, and hemodynamic imbalances can be experienced due to multi-drug regimens, the addition of new drugs, or interactions between drugs and their side effects (4). Nowadays, complementary medicine is gaining popularity since it can be an effective, accessible approach for managing multiple ailments, including cardiovascular disorders, with minimal side effects (5).

Aromatherapy is a type of complementary and alternative medicine that has received special attention in recent years and has been used in the management of

several conditions because of its easy availability, low cost, and safety (6). Aromatherapy uses essential oils (EOs) derived from various herbs (7). These oils can be derived from different parts of the plant, including the flower, leaf, bark, fruit, and root. EOs are made up of saturated and unsaturated aldehydes, hydrocarbons, alcohol, ketones, ethers, oxidized phenols, and terpenes that exude special aromas. Aromatherapy can affect the entire body, leading to physiological and psychological improvements that can be used for preventive and therapeutic purposes in acute and chronic ailments (8,9). It also has some pharmacological properties, including antimicrobial, antiviral, anti-inflammatory, antioxidant, analgesic, hormonal, memory boosting, anti-anxiety, spasmolytic, and anti-fatigue properties (8,10,11). Aromatherapy can be administered in different ways such as through massages, medicated baths, compression, and inhalation (12).

The use of aromatherapy dates back to before 1000 BC when odorous herbs were used in ritual ceremonies, medicinal baths, massages, and therapy (7). The first herbal

Received 10 February 2020, Accepted 16 May 2020, Available online 5 February 2021

<sup>1</sup>Department of Traditional Medicine, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. <sup>2</sup>Traditional Medicine and Matria Medica Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. <sup>3</sup>Department of Traditional Medicine, School of Persian Medicine, Tehran University of Medical Sciences, Tehran, Iran. <sup>4</sup>Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran. <sup>5</sup>Iranian Traditional Medicine Clinic, Amirmomenin Hospital, Semnan University of Medical Sciences, Semnan, Iran.

\*Corresponding Author: Reza Ilkhani, Tel/Fax: 98-21-88773521, +989126201496, Email: ilkhanir@sbmu.ac.ir



distillation for producing the EO was performed by Ibn-e-Sina (980-1037 AD), the prominent Persian physician who described various steps of distilling the rose flower for achieving the EO (10). Modern aromatherapy was started in 1928 when French chemist Rene Gattefosse began using odorous herbs for managing various conditions and coined the term “aromatherapy” (13).

There are several works regarding the benefits of aromatherapy in cardiovascular disorders. Due to the high incidence of cardiovascular disorders and their complications, as well as the benefits of aromatherapy, this study was performed to review aromatherapy for cardiovascular disorders from Persian medicine and modern articles.

## Methods

This review study was accomplished by searching through Persian and modern medicine documents. First, Persian references were searched by the “Comprehensive Library of Traditional and Islamic Medicine” software (Noor Digital Library) using keywords such as “Booyidan”, “Shamm”, “Lakhlakheh”, “Bakhur”, “Ghalb”, and “Dill”. Single herbs were included in this study while excluding multiherbal preparations. The temperament of each herb was determined using “Makhzan-ol-Advieh” (an old Persian pharmacology reference), and their botanical names were identified from PDR for Herbal Medicines.

The data were collected and categorized. Several databases such as Web of Science (ISI), Scopus, PubMed, ScienceDirect, and Google Scholar were searched for human trials (1993-2019) using aromatherapy in cardiovascular disorders, including keywords such as “cardiovascular disease”, “cardiovascular disorder”, “heart”, “coronary”, “cardiac”, “aroma”, and “aromatherapy”. Human clinical trials relevant to cardiovascular disorders and aromatherapy were included in the study. Then, the abstracts and full texts were evaluated and important items were extracted accordingly.

## Results

### Aromatherapy in Cardiovascular Disorders Based on Persian Medicine

Persian medicine is an ancient school of medicine that has evolved through centuries by the efforts of great scholars such as Avicenna (980-1037) and Jorjani (1042-1137). In Persian medicine, the heart is considered as the most vital organ. It is regarded as the origin of life and all body faculties, and therefore, its health can guarantee the normal functioning of other organs. However, cardiac ailments can also affect the function of all other organs (14).

Persian scholars believed that the heart is not only responsible for blood circulation but it also affects one's emotional states (14,15). According to Persian references, emotional states can influence the heartbeat. For instance, anger can increase the speed and force of the pulse while

grief and sadness can decrease it. Sudden fear can make the pulse speedy and irregular whereas happiness and joy can make the pulse slow and soft.

In addition to their influence on physical health, cardiovascular disorders can lead to mental conditions such as stress, depression, and anxiety that are related to cardiovascular hormone functions (16,17). From the view of Persian medicine, aromatherapy is one approach for managing cardiovascular disorders. It is recommended to avoid the smell of sewage and malodorous herbs for heart protection and use fragrant herbs because any aromatic herb is potentially a medicine for the heart (15,18,19). It is believed that inhaling pleasant smells has mood-elevating and cardiogenic effects, and subsequent positive effects on the heart can appear quickly (18,20).

Considering that the basis of all therapies in Persian medicine is the determination of temperament, individuals with warm and cold temperaments are advised to use cool and warm aromatic herbs, respectively (15). The use of mood-elevating aromas can be beneficial for cardiac ailments because emotional states can affect cardiac function (21).

### Methods of Aromatherapy in Persian Medicine

Persian medicine includes various aromatherapy methods such as olfaction or smelling, Lakhlakheh (smelling a liquid in a vessel), Bakhur (inhalation of the smoke), Enkebab (a vapor bath), and the anointment of the nostrils (22-24).

### The Effect of Aromatherapy on the Heart in Persian Medicine

In Persian medicine references, various aromatherapy methods are applied to boost the heart, elevate mood, and manage palpitations and syncope. Considering that the heart supplies the body with oxygenated blood and various nutrients, any weakness in its functioning can affect the whole body. One approach to heart support is the use of herbs that act by balancing the humors and temperament, and subsequently, reducing sorrow and sadness.

Herbs that have these effects are known to be enlivening (*Mofarrahah*). Persian scholars believe that the heart is the center of emotions and mental states and there is a reciprocal relationship between the heart and emotional symptoms. A healthy heart requires balanced emotions (22), and the heart is the center of joy.

The aroma is the main property of enlivening herbs, thus apart from their oral use, they are also used in aromatherapy (22,25). A palpitation is the unpleasant feeling of any abnormal heartbeat and has several possible causes (26). In Persian medicine, aromatherapy using herbs with cold and warm temperaments has been suggested to reduce palpitations (15,27). The syncope and loss of consciousness are two other conditions that are caused by a weak heart according to Persian medicine (18). In both cases, aromatherapy has been suggested as an

effective approach. Single herbs used for aromatherapy in Persian medicine are shown in Table 1.

### Aromatherapy in Cardiovascular Disorders in Modern Medicine

To evaluate the proposed findings by modern medicine studies regarding the role of aromatherapy in cardiovascular disorders, the search was conducted using specific keywords. From 115 articles, 57 cases were duplicates and were excluded from the review. Twenty-seven studies were incomplete. Nine studies were related to aromatherapy and sleep quality in cardiovascular patients and thus were excluded from further analysis. Finally, 22 clinical trials regarding the effect of aromatherapy in cardiovascular patients were included in this review study. The inclusion and exclusion of studies are shown in Figure 1.

Several documents support the role of aromatherapy in cardiovascular disorders. Cardiovascular patients need various diagnostic and therapeutic interventions. Anxiety, fear, pain, and sleeping disorders in these patients can lead to the increased oxygen consumption of myocardium, palpitations, and hypertension, as well as elevated levels of epinephrine and norepinephrine. On the other hand,

the addition of new medicines to the patient's list of heart medicines can lead to drug interactions and the emergence of new side effects. Therefore, approaches that do not involve drugs (e.g., aromatherapy) are often considered as acceptable options (32, 33).

Changes in anxiety, systolic and diastolic blood pressure, pulsation, and breathing were investigated in these studies. Aromatherapy with lavender was found to be effective in decreasing anxiety, systolic and diastolic blood pressure, and pulse rate. In other cases, the combination of lavender, German chamomile, and bitter orange reduced anxiety and systolic and diastolic blood pressure (Table 2).

### Discussion

The purpose of this study was to evaluate the effect of aromatherapy on cardiovascular disorders in Persian and modern medicine. This effect has been frequently referenced in Persian medicine works and has been supported by studies in modern medicine. Although its effect on the subcutaneous tissue has been mentioned as the possible mechanism of action for aromatherapy, it is believed that olfactory stimulation and biologic signals in nose receptor cells are responsible for aromatherapy

**Table 1.** Single Applied Herbs for Aromatherapy in Persian Medicine

Common Name	Scientific Name	Temperament (Mizaj)	Effects on Cardiovascular Disorders
Myrtle	<i>Myrtus Communis</i>	Cold and dry	Heart tonic, Mofarreh, and relieves palpitation (20, 22)
Cockscomb	<i>Ocimum basilicum</i>	Hot and dry	Mofarreh (28)
Melissa	<i>Asperugo procumbens</i>	Hot and dry	Relieves palpitation (29)
Quince	<i>Cydonia vulgaris</i>	Hot and wet	Heart tonic (21), Mofarreh, and removes palpitation (22)
Egyptian willow	<i>Salix aegyptiaca</i>	Cold and wet	Heart tonic (21)
Flea mint	<i>Mentha pulegium</i>	Hot and dry	Heart tonic and useful in syncope (23)
Straw		Cold and dry	Heart tonic (22)
Bergamot orange	<i>Citrus bergamia</i>	Hot and dry	Heart tonic and Mofarreh (22, 23)
Wild cucumber	<i>Cucumis sativus</i>	Cold and wet	Heart tonic and useful in syncope (15, 28)
Peach	<i>Amygdalus persica</i>	Cold and wet	Useful in syncope (18)
Basil	<i>Ocimum basilicum</i>	Hot and dry	Heart tonic (18, 28)
Saffron	<i>Crocus sativus</i>	Hot and dry	Mofarreh, heart tonic, delivers the strength of drugs to the heart, creates joy and laughter and is useful in syncope (18, 22)
Lily	<i>Lilium</i>	Hot and dry	Heart tonic (14)
Apple	<i>Pyrus malus</i>	Hot and wet	Heart tonic and useful in syncope (21)
Indian sandalwood	<i>Santalum sp.</i>	Cold and dry	Heart tonic and useful in syncope (18)
Incense Tree	<i>Aloexylon agalloca</i>	Hot and dry	Heart tonic, Mofarreh (22, 30), and useful in syncope (18)
Lemon balm	<i>Ocimum pilosum</i>	Hot and dry	Heart tonic and removes palpitation (31)
Sweet William	<i>Dianthus barbatus</i>	Hot and dry	Useful in syncope and removes palpitation (18)
Camphor	<i>Cinnamomum camphora</i>	Cold and dry	Useful in syncope (14)
Pear	<i>Pyrus communis</i>	Hot and wet	Removes palpitation, Mofarreh, and heart tonic (23)
Coriander	<i>Coriandrum sativum</i> L	Cold and dry	Heart tonic (18)
Rose	<i>Rosa damascena.</i>	Cold and dry	Heart tonic, useful in syncope, Mofarreh, and removes palpitation (18, 20, 22)
Musk		Hot and dry	Heart tonic, removes palpitation, and useful in syncope (18)
Amaryllis	<i>Hippeastrum belladonna</i>	Hot and dry	Heart tonic (23)
Water lily	<i>Nymphaea alba</i>	Cold and wet	Heart tonic (18, 22)

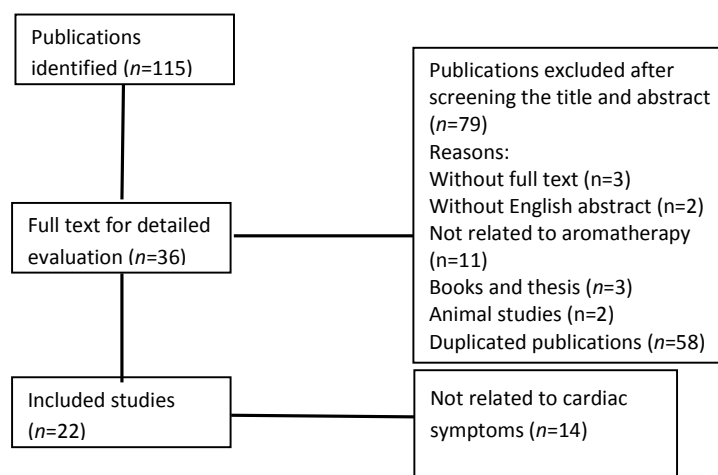


Figure 1. Flow Chart of Trial Selection Process.

effects (54,55). Olfactory stimulation reaches the olfactory bulb through aroma molecules and then enters the limbic system and the hypothalamus, which are highly sensitive to emotions. Olfactory stimulation leads to the release of neurotransmitters such as serotonin, enkephalin, endorphins, and noradrenaline in the brain, which is responsible for various mental and physical effects in individuals (8,45,56). Among these neurotransmitters, enkephalin increases the pain threshold and mediates euphoria (57).

Many cardiovascular patients suffer from anxiety and fear, and these emotions can affect their illness. In other words, mood can affect the prognosis of their disease through the sympathetic system of the body (58). Aromatherapy can lead to a reduction in plasma cortisol levels and the activation of the parasympathetic system, and, therefore, reduce physiological stress, blood pressure, and pulse rate and induce tranquility (40,59). Similarly, Persian references mention the close relationship between the brain and the heart to the extent that dystemperament in one can lead to dystemperament in the other, and subsequently, the establishment of a disease. An example is found in the use of fragrant herbs that are absorbed by the nose and exert a cardiogenic effect. Heart reinforcement can improve the entire body's health because it is the provider of vital energy in the body (60). Previous research pointed to the uses of aromatherapy in managing palpitation and syncope and developing joy (15). Among 22 studies, 17 cases used lavender aromatherapy, each showing different effects such as reductions in anxiety, systolic, and diastolic blood pressure, respiratory rate, and pulse rate (4,34-42). In a study conducted by Shiina et al, lavender aromatherapy resulted in the reduction of plasma cortisol levels, as well as increased coronary blood flow when compared to the control group (43). In a review study, the most common EOs used to improve sleep quality in the patients included lavender alone or in combination with other oils (61). Zhong et al found that

compound EO, compatible with the lavender oil, orange, rose, and other aromatic medicine EOs, has anti-anxiety, sedative-hypnotic, and anti-depression effects (62). In the Persian medical literature, lavender (*Ostokhodus*) is mentioned as a brain tonic, and its oral form is used as a cardiogenic and an enlivening agent. However, no evidence of lavender use was found in the aromatherapy of cardiovascular disorders in the Persian literature (22). It seems that designing clinical trials to compare the effects of lavender aromatherapy and oral lavender in the treatment of cardiovascular ailments can provide valuable information. In addition, methods for preparing aromatherapy oils may vary in different countries and thus lead to various results (10). Evidence shows that aromatherapy has no serious side effects. Several aromatic oils are used as food additives and have been declared safe by the Food and Drug Administration in the United States (8).

More than 100 herbal preparations are mentioned in Persian medicine references possessing cardiogenic properties (63). Some have been proven to have positive inotropic and cardiac tonic effects (64-67). Saffron, a well-known example, has shown cardiogenic properties due to its active substances such as crocin and crocetin (68, 69) that have been considered in traditional medicines such as Ayurveda and Chinese medicine. It has been used to treat different ailments due to its components, which are responsible for its properties (70-72). Crocetin has protective effects on thrombosis, atherosclerosis, hypertension, and cardiac hypertrophy by its anti-inflammatory, antioxidants, anti-platelet, anti-apoptosis, and immunomodulatory activity (72,73). In their study, Yan et al showed that crocetin inhibits reactive oxygen production and keeps working to improve the cardiac injury in rats (74). Similarly, Zheng et al demonstrated the antihyperlipidemic effect of saffron (75). Likewise, Asdaq et al examined the hypolipidemic and antioxidant effect of saffron and found that crocin can reduce free radicals

Table 2. Clinical Trials of Aromatherapy in Cardiovascular Diseases

Author and Type of the Study	Interventions	Results	Authors' Comments
Ebrahimi Hosein Abadi et al (34), a randomized, double-blind, placebo-controlled clinical trial on 98 patients	Experimental group: Inhaled lavender EO Placebo group: Inhaled distilled water	Significant differences were observed between the two groups in the mean systolic blood pressure after the second day of intervention and the mean diastolic blood pressure after the first day of the intervention.	"Aromatherapy with the lavender EO can be used as a simple, complementary, and low-cost therapeutic intervention after CABG surgery to stabilize a patient's blood pressure."
Bahrami et al (35), a randomized controlled trial conducted on 90 older women with ACS	Intervention group: Reflexology with the lavender EO Control group: Routine care	Significant differences in the levels of anxiety and depression, heart rate, systolic, diastolic, and mean arterial pressure between the groups were reported although the difference in the respiratory rate was not significant.	"Aromatherapy massage could be considered for alleviating psychological and physiological responses in older women with ACS."
Bahrami et al (36). Randomized clinical trial in 62 elderly women with ACS	Experimental group: Reflexology massage with the lavender EO. Control group: Routine care	A significant decrease was reported in systolic, diastolic, and mean blood pressure while an increase was found in O <sub>2</sub> saturation.	"Aromatherapy massage was recommended as a non-pharmacological intervention in ACS."
Moradi et al (37). Clinical trial on 80 patients with ischemic heart diseases	Experimental group: Inhaled lavender EO. Control group: Inhaled distilled water	A significant reduction was reported in the level of state anxiety in the experimental group compared with the control group. In addition, a significant difference was observed in systolic and diastolic blood pressure, pulse rates, and respiratory in the two groups.	"Aromatherapy could decrease the anxiety level and vital signs of patients with ischemic heart diseases."
Pourmovahed et al (38), a clinical trial study on 64 candidate patients for CABG	Case group: Inhaled lavender EO. Control group: Inhaled distilled water	A significant decrease was found in the level of anxiety after the intervention between the two groups.	"Aromatherapy with the lavender oil according to its positive effects may be used as a nursing intervention for reducing the anxiety level in patients before CABG."
Rajai et al (39), a randomized clinical trial on 60 patients undergoing CABG surgery	Experimental group: Inhaled lavender essence Control group: No intervention	Significant differences were detected between the two study groups in heart rate and anxiety level with no significant differences regarding the stress level and other physiological variables.	"Aromatherapy can be considered a safe and effective relaxation method before invasive interventions."
Rajai et al (4), a pilot study on 30 patient candidates of coronary artery bypass graft	Intervention: Inhaled Lavender EO	Significant differences were observed between the three-time phases (i.e., before the surgery, along with five and 30 minutes after the intervention) in the pulse, respiration, and stress.	"Aromatherapy can be an effective way to reduce stress levels and pulse in patient candidates for coronary artery bypass graft."
Nategh et al (40), a single-blind randomized clinical trial on 110 patients hospitalized in the coronary care unit	Experimental group: Lavender essence aromatherapy Placebo: Almond oil drop aromas	A descending trend was reported in systolic and diastolic blood pressures and heart rate changes in both groups with no significant difference in-between.	"Given its positive effects on hemodynamic indices, aromatherapy can be used as an effective alternative therapy."
Tahmasebi et al (41), a clinical trial on 96 patients hospitalized for coronary angiography	Intervention group: Aromatherapy with lavender. Control group: Inhaled two distilled water	A significant reduction was observed in the systolic blood pressure, pulse rate, and respiration rate in the interventional group compared to the control group.	"Using aromatherapy before stressful situations like diagnostic techniques could be suggested to keep vital signs in a normal range."
Tahmasbi et al (42), a clinical trial on 91 patients hospitalized for coronary angiography	Subject group: Lavender inhalation Control group: No intervention	A significant decline was found in the anxiety level after aromatherapy. Further, a significant difference was reported in systolic and diastolic blood pressure, respiratory rate, and heartbeat in the two groups.	"Aromatherapy can be used as health care intervention and mental support without any side effects for patients before invasive interventions such as angiography."



Table 2. Continued

Author and Type of the Study	Interventions	Results	Authors' Comments
Shiina et al (2008) (43), a clinical trial on 30 young healthy men	Intervention group: lavender aromatherapy Control group: no intervention	A significant decrease was observed in the serum cortisol while an increase in coronary flow velocity reserve in the aromatherapy group.	"Lavender aromatherapy has relaxation effects and may have beneficial acute effects on coronary circulation."
Song et al (44), Non-equivalent control group with a pretest-posttest design with 64 patients receiving CAG	Experimental group: Inhalation of the aroma oil blended with lavender, ylang-ylang and neroli at a ratio of 4:2:1 Control group: Conventional nursing care	After 4 hours of intervention, the indexes of stress, systolic blood pressure, and diastolic blood pressure were significantly different between the experimental and control groups.	"Aromatherapy can be used as a nursing intervention for patients receiving CAG."
Nematollahi et al (45), a controlled random, parallel, and single-blind clinical trial on 60 patients with ACS	Experiment group: Aromatherapy with a combination of the EOs of lavender, neroli, and Matricaria recutita (6:2:0.5) Control group: No intervention	A significant difference was detected in the mean score of anxiety post- and pre-intervention in the experimental group. Furthermore, the mean score of anxiety increased in the control group while decreasing in the experiment group.	"Aromatherapy is a cost-effective and uncomplicated method that can reduce the anxiety of patients with ACS hospitalized in the CCU."
Cho et al (2), a nonequivalent control group nonsynchronised quasiexperiment with 56 patients undergoing a stent insertion during coronary angiography	Aromatherapy group: Inhalation of the blend of lavender, roman chamomile, and neroli oils at a ratio of 6 : 2 : 0.5 : 2) Control group: Conventional nursing care	Anxiety and quality of sleep improved significantly. No significant difference was found in the systolic and diastolic blood pressure by time or a group-by-time interaction.	"Aromatherapy may be used as an independent nursing intervention for reducing the anxiety levels whereas improving the sleep quality of PCI patients."
Meshgin Abady et al (46), a semi-experimental study on 76 patients undergoing elective PCI	Case group: Aromatherapy massage with a solution composed of mint, celery, and lavender essences in the sweet almond oil (%1 concentration) Control group: Routine care with eight hours of bed rest	Anxiety decreased significantly in the experimental group in comparison with the control group. None of the patients had bleeding. Moreover, 92.1% of patients were satisfied with the intervention procedure.	"Aromatherapy massage is a safe, non-expensive, and effective method in decreasing anxiety of patients undergone the PCI."
Ghasemi et al (47), a randomized, controlled clinical trial on 160 patients in the cardiovascular ICU after open heart surgery	Case group 1: Aromatherapy with lavender fragrance Case group 2: Aromatherapy with rose fragrance Placebo group: Water Control group: No intervention	A significant decline was observed in the systolic blood pressure with aromatherapy. However, aromatherapy showed no significant difference regarding physiological indicators in rose and lavender groups.	"Regarding positive effects of aromatherapy on hemodynamic indicators, this method can be applied as an effective complementary treatment."
Tahmasebi et al (48) a quasi-experimental three-group clinical trial on 102 patients hospitalized for coronary angiography	Case group 1: Benson Relaxation Case group 2: Inhalation of lavender Control group: No intervention.	A significant reduction in the anxiety and variables of systolic blood pressure, pulse rate, and respiratory rate in the Aromas and Relaxation groups compared to the control group.	"Applying complementary methods is highly recommended for decreasing anxiety."

Table 2. Continued

Author and Type of the Study	Interventions	Results	Authors' Comments
Stevensen et al (49), a randomized controlled trial on 100 patients post-cardiac surgery	Massage Group 1: Foot massage with the neroli EO Massage Group 2: Foot massage with vegetable oil (kernal oil) Control group: Routine care	A statistically significant psychological benefit was derived from both groups receiving massage compared to the controls. A significant difference was reported in respiratory with massage with or without the EO.	
Abdi Joubari et al (50), a clinical trial study on 78 patients hospitalized for coronary angiography	Case group: Aromatherapy with orange EO Control group: Inhalation of the sterile water	The level of anxiety decreased significantly after the treatment.	"Aromatherapy can be used for decreasing anxiety in clinical situations."
Lotfi et al (51), a single-blind randomized clinical trial on 96 patients out of CCU inpatients	Case group: Aromatherapy with Melisa officinalis Control group: Odorless sesame oil	A significant difference was found between the mean total scores of anxiety in both groups.	"Aromatherapy can exert positive effects on diminishing the anxiety of cardiac patients."
Fazlollahpour-Rokni et al (52), a single-blind randomized clinical trial of 66 patients undergoing CABG surgery	Experimental group: Routine care and Rosa damascene aromatherapy Control group: Routine care.	No significant reduction was observed in anxiety after aromatherapy.	"Future research with larger sample sizes and using different concentrations of rose EO is needed to achieve more definitive conclusions."
Babaii et al (53), a randomized controlled trial on 60 patients before cardiac catheterization	Experimental group: Rosa aromatherapy Control: Routine care	No significant difference was reported in the level of anxiety between pre- and post-treatment in both groups.	"Aromatherapy, as administered in this study, is not beneficial."

while improving the harms of hyperlipidemia (76). Other examples are quince and apple with their polyphenol and flavonoid compounds, respectively (77-79). In another study, Moore et al reported the antihypertensive, antihyperlipidaemic, and antithrombotic effects of *Cydonia* leaf (80). Abliz et al showed that *Cydonia oblonga* leaf extracts have hepatoprotective and hypolipidaemic effects (81).

Many herbs such as lemon balm, lavender, borage, and cinnamon are used as single or compound forms in various preparations including decoctions (22). They have one quality in common, namely, they all possess fragrances that promote cardiac functions. This subject is vital because improving a specific organ is an important principle in Persian medicine and the heart is responsible for the perfusion of the whole body (63).

To the best of our knowledge, no study has compared the effectiveness of aromatherapy in managing cardiovascular disorders from the view of Persian and modern medicine.

Other aromatic herbs are good candidates for managing cardiovascular disorders in future clinical trials. Among them, the rose flower has shown inotropic and chronotropic effects in various studies and occupies a special place in Persian medicine as a cardiogenic (67). Damask rose encloses three hundred different types of composites that increase the para-sympathetic system while decreasing the activity of the sympathetic system (54). Setzer et al reported that the EO of *Rosa damascena* has a relaxing effect on emotions and getting a sense of well-being (82). Hongratanaworakit in his controlled study represented that rose oil can decrease blood pressure, breathing rate, and blood oxygen saturation and has a relaxing effect (83). Accordingly, using aromatherapy according to the temperament of the patient can improve the design of future trials.

## Conclusions

In general, aromatherapy has a prominent position in Persian medicine resources, and Persian scholars have confirmed the effects of aromatherapy in managing cardiovascular disorders. New research also supports this idea. In many studies, aromatherapy has been used alongside diagnostic procedures while this cost-effective, accessible, and safe approach can be applied for therapeutic purposes in Persian medicine. Considering the positive effects of aromatherapy, its inclusion is suggested in the palliative care setting for cardiovascular disorders. Using aromatherapy and other complementary medicine can meet the demand for new therapeutic guidelines. Thus, it is suggested that additional clinical trials be conducted based on Persian medicine references for the investigation of aromatherapy in managing cardiovascular disorders.

## Conflict of Interests

Authors have no conflict of interests.

## Ethical Issues

This study was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences (The ethics code of IR.SBMU.REC.1398.107).

## Acknowledgments

This paper was drawn from Vahid Aliannezhadi's PhD thesis (No. 200) and research project (No. 215) from the School of Traditional Medicine, Shahid Beheshti University of Medical Sciences. In addition, the authors gratefully acknowledge the help of the Department of Traditional Medicine, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences.

## References

1. World Health Organization (WHO). Cardiovascular Diseases (CVDs). WHO; 2017. [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)).
2. Cho MY, Min ES, Hur MH, Lee MS. Effects of aromatherapy on the anxiety, vital signs, and sleep quality of percutaneous coronary intervention patients in intensive care units. *Evid Based Complement Alternat Med*. 2013;2013:381381. doi:10.1155/2013/381381
3. Sheikhi MA, Ebadi A, Gholizadeh B, Ramezani A. Risk factors for hemodynamics change after cabg surgery in southwest of Iran. *Int J Bioassays*. 2015;4(2):3659-3663. doi:10.21746/ijbio.2015.02.007
4. Rajai N, Teymouri F, Sajadi A, Zareiyan A, Seyedmazhari M. The effect of inhalation aromatherapy on physiological and psychological parameters of patient's candidate for coronary artery bypass graft: pilot study. *Alborz University Medical Journal*. 2016;5(3):173-178. doi:10.18869/acadpub.aums.5.3.173
5. Moeini M, Khadibi M, Bekhradi R, Mahmoudian SA, Nazari F. Effect of aromatherapy on the quality of sleep in ischemic heart disease patients hospitalized in intensive care units of heart hospitals of the Isfahan University of Medical Sciences. *Iran J Nurs Midwifery Res*. 2010;15(4):234-239.
6. Cooke B, Ernst E. Aromatherapy: a systematic review. *Br J Gen Pract*. 2000;50(455):493-496.
7. Keyhanmehr AS, Kolouri S, Heydarirad G, Mofid B, Mosavat SH. Aromatherapy for the management of cancer complications: a narrative review. *Complement Ther Clin Pract*. 2018;31:175-180. doi:10.1016/j.ctcp.2018.02.009
8. Ali B, Al-Wabel NA, Shams S, Ahamad A, Khan SA, Anwar F. Essential oils used in aromatherapy: a systemic review. *Asian Pac J Trop Biomed*. 2015;5(8):601-611. doi:10.1016/j.apjtb.2015.05.007
9. Vakilian K, Keramat A, Gharacheh M. Controlled breathing with or without lavender aromatherapy for labor pain at the first stage: a randomized clinical trial. *Crescent J Med Biol Sci*. 2018;5(3):172-175.
10. Boehm K, Büsing A, Ostermann T. Aromatherapy as an adjuvant treatment in cancer care--a descriptive systematic review. *Afr J Tradit Complement Altern Med*. 2012;9(4):503-518. doi:10.4314/ajtcam.v9i4.7
11. Mazandarani M, Zeinali Z, Ghafourian M. Autecology essential oil composition, antibacterial, anti candidacies and ethnopharmacological survey of *Ferula gummosa* L. as anti infection to treat of vaginal infections in traditional medicine of Razavi Khorasan province (North East of Iran). *Crescent J Med Biol Sci*. 2015;2(2):42-47.
12. Lindquist R, Tracy MF, Snyder M. *Complementary and Alternative Therapies in Nursing*. Springer Publishing Company; 2018.
13. Tillett J, Ames D. The uses of aromatherapy in women's health. *J Perinat Neonatal Nurs*. 2010;24(3):238-245. doi:10.1097/JPN.0b013e3181e75d
14. Jorjani E. Zakhireye Kharazmshahi. Qom: Moasseseh Ehyae Teb



- Tabiee; 1391.
15. Avicenna. Qanun fi al -Tibb. Beirut: Dar Ehia Al-Tourath Al-Arabi; 2005.
  16. Mosaddegh M, Shariatpanahi N, Minaee MB, Ahmadian-Attari MM. Avicenna's view on heart and emotions interaction. *Int J Cardiol.* 2013;162(3):256-257. doi:10.1016/j.ijcard.2012.06.091
  17. Mohamadpour M, Dolatabadi LK, Soleymani A, et al. Cardioprotective effects of curcumin co-treatment in rats with establishing chronic variable stress stereology study. *Crescent J Med Biol Sci.* 2018;5(4):306-11.
  18. Azam Khan HM. The Greatest Elixir (Exir Azam). Tehran: Research Institute for Islamic and Complementary Medicine 2009. [Persian].
  19. Shamsodin A. KHazaen al- moluk. Tehran: Iran University of Medical Sciences; 2001.
  20. Al-Nafis I. Al-Shamel fi Sanaat Al-Tebieh. Tehran: Central Library of University of Tehran Publications; 2013.
  21. Kermani H. Daghagh-alalaj (Minutes of Treatment). Kerman: Saadat; 1983.
  22. Aghili Khorasani M. Makhzan-al-Advia. Tehran: Research Institute for Islamic and Complementary Medicine, Iran University of Medical Sciences; 2010.
  23. Tonkaboni M. Tohfeh al-momenin. Tehran: Shahid Beheshti University of Medical Sciences; 2007.
  24. Zarshenas MM, Zargaran A, Müller J, Mohagheghzadeh A. Nasal drug delivery in traditional Persian medicine. *Jundishapur J Nat Pharm Prod.* 2013;8(3):144-148. doi:10.17795/jjnpp-9990
  25. Aghili Khorasani M. Kholasat Al-Hekmah. Qom: Esmailian Publication; 2006.
  26. Ershadifar T, Minaiee B, Gharooni M, et al. Heart palpitation from traditional and modern medicine perspectives. *Iran Red Crescent Med J.* 2014;16(2):e14301. doi:10.5812/ircmj.14301
  27. Kermani N. Sharh al-Asbab va al-Alamat. Qom: Esmailian; 2008
  28. Mansour FS. Mansouri's Adequacy (Kefaye Mansouri). Tehran: Research Institute for Islamic and Complementary Medicine; 2003.
  29. Tabari R. Ferdous al-Hekma fi al-Teb. Beirut: Dar al-Kotob al-ilmiyah; 2002.
  30. Aghili Khorasani M. Gharabadin-e-Kabir. Tehran Research Institute for Islamic and Complementary Medicine, Tehran University of Medical Sciences; 2012
  31. Heravi AM. Al-Abnnean Haghayegh al-Advie. Tehran: Tehran University; 1968.
  32. Tan Yee kit C. Effectiveness of Aromatherapy on Preoperative Anxiety, Mean Arterial Pressure and Heart Rate Among Patients Before Surgeries: A Systematic Review and Meta- Analysis [dissertation]. ScholarBank@NUS Repository; 2019.
  33. Zarifnejad G, Eshghi E, Mirhaghi A, Ghorbanzade H. The effects of aromatherapy with lavender essential oil on the severity of headaches induced by nitroglycerin infusion in patients admitted to the coronary care unit. *Avicenna J Phytomed.* 2015;5:36.
  34. Ebrahimi Hosein Abadi S, Paryad E, Ghanbari Khanghah A, Pasdaran A, Kazem Nezhad Leyli E, Sadeghi Meibodi AM. Effects of aromatherapy using lavender oil on hemodynamic indices after coronary artery bypass graft surgery. *J Holist Nurs Midwifery.* 2018;28(3):163-170. doi:10.29252/hnmj.28.3.163
  35. Bahrami T, Rejeh N, Heravi-Karimooi M, Vaismoradi M, Tadrissi SD, Sieloff C. Effect of aromatherapy massage on anxiety, depression, and physiologic parameters in older patients with the acute coronary syndrome: a randomized clinical trial. *Int J Nurs Pract.* 2017;23(6). doi:10.1111/ijn.12601
  36. Bahrami T, Rejeh N, Heravi-Karimooi M, Tadrissi SD, Amin G. Effect of aromatherapy massage on fatigue and hemodynamic parameters in elderly women with acute coronary syndrome. *J Urmia Nurs Midwifery Fac.* 2016;14(4):343-351. [Persian].
  37. Moradi K, Ashtarian H, Darabi F, Hashemian AH, Saifi F. A survey on the effects of Lavender aromatherapy on the anxiety and vital signs of patients with ischemic heart diseases hospitalized in cardiac intensive care units. *J Clin Res Paramed Sci.* 2016;4(4):301-310. [Persian].
  38. Pourmovahed Z, Zare Zardini H, Vahidi AR, Jafari Tadi E. The effect of inhalation aromatherapy on anxiety level of the patients before coronary artery bypass graft surgery (CABG). *Journal of Rafsanjan University of Medical Sciences.* 2016;15(6):551-562. [Persian].
  39. Rajai N, Sajadi SA, Teymouri F, Zareiyana A, Siavoshi S, Malmir M. The effect of aromatherapy with lavender essential oil on anxiety and stress in patients undergoing coronary artery bypass graft surgery. *Jundishapur J Chronic Dis Care.* 2016;5(4):e34035. doi:10.17795/jjcdc-34035
  40. Nategh M, Heidari Mr, Ebadi A, Kazemnejad A, Babaei Beigi MA. Effect of lavender aromatherapy on hemodynamic indices among patients with acute coronary syndrome: a randomized clinical trial. *Iran J Crit Care Nurs.* 2015;7(4):201-208.
  41. Tahmasebi H, Abbasi E, Zafari M, Darvishi H. The impact of aromatherapy on hemodynamic condition of patients experiencing coronary angiography. *Med Surg Nurs J.* 2013;2(1-2):26-32. [Persian].
  42. Tahmasebi H, Mahmoodi G, Mokhberi V, Hassani S, Akbarzadeh H, Rahnamai N. The impact of aromatherapy on the anxiety of patients experiencing coronary angiography. *Zahedan J Res Med Sci.* 2012;14(3):51-55. [Persian].
  43. Shiina Y, Funabashi N, Lee K, et al. Relaxation effects of lavender aromatherapy improve coronary flow velocity reserve in healthy men evaluated by transthoracic Doppler echocardiography. *Int J Cardiol.* 2008;129(2):193-197. doi:10.1016/j.ijcard.2007.06.064
  44. Song EJ, Lee MY. [Effects of aromatherapy on stress responses, autonomic nervous system activity and blood pressure in the patients undergoing coronary angiography: a non-randomized controlled trial]. *J Korean Acad Nurs.* 2018;48(1):1-11. doi:10.4040/jkan.2018.48.1.1
  45. Nematollahi M, Bazeli J, Moghaddam M, Aalami H. Effect of aromatherapy on anxiety in patients with acute coronary syndrome hospitalized in cardiac care unit. *Bali Med J.* 2017;6(2):331-336. doi:10.15562/bmj.v6i2.385
  46. Meshgin Abadi N, Ramezani Badr F, Mahmoodi K. Effect of aromatherapy massage on anxiety among patients undergoing percutaneous coronary intervention. *Nurs Midwifery Care J.* 2012;2(1):14-22. [Persian].
  47. Ghasemi S, Babatabar Darzi H, Ebadi A. Comparison of the effects of aromatherapy with rose and lavender on physiological parameters of patients undergoing open heart surgery: a clinical trial. *Crit Care Nurs J.* 2017;10(2):e10029. doi:10.5812/ccn.10029
  48. Tahmasebi H, Asghari N, Poorkhiz H, Darvishkhezri H. The effect of benson relaxation and aromatherapy on anxiety and physiological indicators in patients undergoing coronary angiography. *J Urmia Nurs Midwifery Fac.* 2015;12(12):1094-1103. [Persian].
  49. Stevensen C. The psychophysiological effects of aromatherapy massage following cardiac surgery. *Complement Ther Med.* 1994;2(1):27-35. doi:10.1016/0965-2299(94)90156-2
  50. Abdi Joubari H, Abdi Joubari F, Tahmasebi H, Hejazi S. Effect of aromatherapy with orange essential oils on anxiety in patients experiencing coronary angiography: a randomized control trial. *J Urmia Nurs Midwifery Fac.* 2018;15(11):806- 814. [Persian].
  51. Lotfi A, Shiri H, Ilkhani R, Sefidkar R, Esmaeeli R. The efficacy of aromatherapy with melissa officinalis in reducing anxiety in cardiac patients: a randomized clinical trial. *Crescent J Med Biol Sci.* 2019;6(3):293-299.
  52. Fazlollahpour-Rokni F, Shorofi SA, Mousavinasab N, Ghafari R, Esmaeili R. The effect of inhalation aromatherapy with rose essential oil on the anxiety of patients undergoing coronary artery bypass graft surgery. *Complement Ther Clin Pract.* 2019;34:201-207. doi:10.1016/j.ctcp.2018.11.014

53. Babaii A, Abbasinia M, Hejazi SF, Seyyed Tabaei SR, Dehghani F. Effect of Rosa aromatherapy on anxiety before cardiac catheterization: a randomized controlled trial. *Health Spiritual Med Ethics*. 2015;293:2-8.
54. Chughtai A, Navaee M, Alijanvand MH, Yaghoubinia F. Comparing the effect of aromatherapy with essential oils of *Rosa damascena* and lavender alone and in combination on severity of pain in the first phase of labor in primiparous women. *Crescent J Med Biol Sci*. 2018;5(4):312-319.
55. Hebb AL, Zacharko RM, Dominguez H, Trudel F, Laforest S, Drolet G. Odor-induced variation in anxiety-like behavior in mice is associated with discrete and differential effects on mesocorticolimbic cholecystokinin mRNA expression. *Neuropsychopharmacology*. 2002;27(5):744-755. doi:10.1016/s0893-133x(02)00354-8
56. Seifi Z, Bikmoradi A, Bazrafshan MR, et al. The effect of inhalation aromatherapy with lavender essential oil on pain severity of patients after coronary artery bypass surgery: a single-blind randomised clinical trial. *J Clin Diagn Res*. 2018;12(7):1-5. doi:10.7860/jcdr/2018/34865.11721
57. Khyasudeen SF, Abu Bakar M. Aromatherapy: it's effect on brain signal, math computation, blood pressure and heart rate. In: Ibrahim F, Osman NAA, Usman J, Kadri NA, eds. 3rd Kuala Lumpur International Conference on Biomedical Engineering 2006. Berlin, Heidelberg: Springer; 2007.
58. Buckle J. Aromatherapy and cardiovascular disease. In: Stein RA, Oz MC, eds. *Complementary and Alternative Cardiovascular Medicine*. Totowa, NJ: Humana Press; 2004:239-254. doi:10.1007/978-1-59259-728-4\_15
59. Hwang JH. [The effects of the inhalation method using essential oils on blood pressure and stress responses of clients with essential hypertension]. *Taehan Kanho Hakhoe Chi*. 2006;36(7):1123-1134. doi:10.4040/jkan.2006.36.7.1123
60. Anushirvani M. Contemplation and Explanation of Vital and Mental Spirits in the literature of Traditional Persian Medicine, and a clinical study on it [thesis]. Tehran University of Medical Sciences; 2013. [Persian].
61. Kim ME, Jun JH, Hur MH. [Effects of aromatherapy on sleep quality: a systematic review and meta-analysis]. *J Korean Acad Nurs*. 2019;49(6):655-676. doi:10.4040/jkan.2019.49.6.655
62. Zhong Y, Zheng Q, Hu P, et al. Sedative and hypnotic effects of compound Anshen essential oil inhalation for insomnia. *BMC Complement Altern Med*. 2019;19(1):306. doi:10.1186/s12906-019-2732-0
63. Ghorbani F, Keshavarz M, Nazem E, Imani AR, Faghihi M. Overall meaning of cardiogenic and its mechanisms of action from the viewpoint of Iranian traditional medicine. *Journal of Islamic and Iranian Traditional Medicine*. 2014;5(3):196-204.
64. Ojha S, Golechha M, Kumari S, Arya DS. Protective effect of *Emblica officinalis* (amla) on isoproterenol-induced cardiotoxicity in rats. *Toxicol Ind Health*. 2012;28(5):399-411. doi:10.1177/0748233711413798
65. Parsaee H, Shafiei MN, Boskabady MH. Effects of hydro-ethanolic extract of berberis vulgaris fruit on rabbit isolated heart. *Daru*. 2006;14(4):208-213.
66. Zhang CM, Gao L, Zheng YJ, Yang HT. Berberine increases myocardial contractility via a Ca<sup>2+</sup>-independent mechanism. *J Cardiovasc Pharmacol*. 2011;58(1):40-48. doi:10.1097/FJC.0b013e31821b70d1
67. Boskabady MH, Vatanprast A, Parsaee H, Boskabady M. Possible mechanism of inotropic and chronotropic effects of *Rosa damascena* on isolated guinea pig heart. *Daru*. 2013;21(1):38. doi:10.1186/2008-2231-21-38
68. Llorens S, Mancini A, Serrano-Díaz J, et al. Effects of crocetin esters and crocetin from *Crocus sativus* L. on aortic contractility in rat genetic hypertension. *Molecules*. 2015;20(9):17570-17584. doi:10.3390/molecules200917570
69. Khazdair MR, Boskabady MH, Hosseini M, Rezaee R, A MT. The effects of *Crocus sativus* (saffron) and its constituents on nervous system: a review. *Avicenna J Phytomed*. 2015;5(5):376-391.
70. Kashima Y, Nakaya S, Miyazawa M. Volatile composition and sensory properties of Indian herbal medicine-Pavonia odorata-used in Ayurveda. *J Oleo Sci*. 2014;63(2):149-158. doi:10.5650/jos.ess13125
71. Dhar MK, Sharma M, Bhat A, Chrungoo NK, Kaul S. Functional genomics of apocarotenoids in saffron: insights from chemistry, molecular biology and therapeutic applications. *Brief Funct Genomics*. 2017;16(6):336-347. doi:10.1093/bfpg/elix003
72. Liu J, Mu J, Zheng C, et al. Systems-pharmacology dissection of traditional Chinese medicine compound saffron formula reveals multi-scale treatment strategy for cardiovascular diseases. *Sci Rep*. 2016;6:19809. doi:10.1038/srep19809
73. Ahmad R, Khan MA, Srivastava AN, et al. Anticancer potential of dietary natural products: a comprehensive review. *Anticancer Agents Med Chem*. 2020;20(2):122-236. doi:10.2174/1871520619666191015103712
74. Yan J, Qian Z, Sheng L, et al. Effect of crocetin on blood pressure restoration and synthesis of inflammatory mediators in heart after hemorrhagic shock in anesthetized rats. *Shock*. 2010;33(1):83-87. doi:10.1097/SHK.0b013e3181a98f55
75. Zheng S, Qian Z, Sheng L, Wen N. Crocetin attenuates atherosclerosis in hyperlipidemic rabbits through inhibition of LDL oxidation. *J Cardiovasc Pharmacol*. 2006;47(1):70-76. doi:10.1097/01.fjc.0000194686.11712.02
76. Asdaq SM, Inamdar MN. Potential of *Crocus sativus* (saffron) and its constituent, crocin, as hypolipidemic and antioxidant in rats. *Appl Biochem Biotechnol*. 2010;162(2):358-372. doi:10.1007/s12010-009-8740-7
77. Lynn A, Hamadeh H, Leung WC, Russell JM, Barker ME. Effects of pomegranate juice supplementation on pulse wave velocity and blood pressure in healthy young and middle-aged men and women. *Plant Foods Hum Nutr*. 2012;67(3):309-314. doi:10.1007/s11130-012-0295-z
78. Bondonno NP, Bondonno CP, Blekkenhorst LC, et al. Flavonoid-rich apple improves endothelial function in individuals at risk for cardiovascular disease: a randomized controlled clinical trial. *Mol Nutr Food Res*. 2018;62(3). doi:10.1002/mnfr.201700674
79. Roelofs EJ, Smith-Ryan AE, Trexler ET, Hirsch KR, Mock MG. Effects of pomegranate extract on blood flow and vessel diameter after high-intensity exercise in young, healthy adults. *Eur J Sport Sci*. 2017;17(3):317-325. doi:10.1080/17461391.2016.1230892
80. Moore N, Hamza N, Berke B, Umar A. News from Tartary: an ethnopharmacological approach to drug and therapeutic discovery. *Br J Clin Pharmacol*. 2017;83(1):33-37. doi:10.1111/bcp.13042
81. Abliz A, Aji Q, Abdusalam E, et al. Effect of *Cydonia oblonga* Mill. leaf extract on serum lipids and liver function in a rat model of hyperlipidaemia. *J Ethnopharmacol*. 2014;151(2):970-974. doi:10.1016/j.jep.2013.12.010
82. Setzer WN. Essential oils and anxiolytic aromatherapy. *Nat Prod Commun*. 2009;4(9):1305-1316. doi:10.1177/1934578x0900400928
83. Hongratanaworakit T. Relaxing effect of rose oil on humans. *Nat Prod Commun*. 2009;4(2):291-296. doi:10.1177/1934578x0900400226