



# The role of aromatherapy with lavender in reducing the anxiety of patients with cardiovascular diseases: A systematic review of clinical trials

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## ABSTRACT

Most studies have shown the positive effects of lavender inhalation in decreasing anxiety in patients with cardiovascular diseases. We aimed to systematically review the role of aromatherapy with lavender in these patients. By PRISMA standards, we explored the studies on the role of aromatherapy with lavender in reducing the anxiety of patients with cardiovascular diseases in English databases through the words and terms “aromatherapy”, “lavender”, “lavandula”, “anxiety”, “cardiovascular diseases”. Out of 16647 papers, 12 papers up to January 2022 encountered the inclusion criteria for involving in this systematic review. The majority of studies (7 studies, 70%) were used Spielberger Standard Questionnaire as a measurement scale for their studies. Lavender aromatherapy was mostly used for myocardial infarction (3 studies, 30%) and coronary artery bypass graft (CABG) surgery (3 studies, 30%) patients. We concluded that aromatherapy with lavender essential oil significantly ameliorated the anxiety signs in some cardiovascular diseases, e.g., CABG surgery, myocardial infarction, and cardiac ischemia; however, more studies are required in this field to obtain more specific evidence.

### Implication for health policy/practice/research/medical education:

Most studies have shown the positive effects of aromatherapy with lavender essential oil on the anxiety of patients with cardiovascular diseases. However, due to the low quality of studies and the low number of studies used, and the disagreement of some studies regarding the positive effect of lavender essential oil on anxiety in cardiovascular patients, it is suggested that more studies be done in this field to obtain more specific evidence.

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## Introduction

Anxiety is a widespread, undesirable, and ambiguous feeling of panic of unknown origin that affects the person and includes hesitancy, weakness, and physiological stimulation (1). Anxiety in an upward trend has affected various aspects of human life and is of great importance as one of the major problems in people's lives (2,3). Anxiety, by definition, requires a number of physical symptoms because each emotional state has a psychological component and a physical component (4). Studies examining the physiological parameters of anxiety disorders show that changes in heart rate, hypertension,

and respiratory crises are major symptoms of anxiety throughout the body (5). Narrowing of the arteries also causes dry mouth and esophageal contractions, creating a feeling of extra physical presence in the throat; sleep disorders are also common in anxiety states. Depending on the severity and duration of exposure to this psychological disorder, the person may be prone to diseases such as neurological diseases, cardiovascular disease, and even decreased immune system (6,7).

Over the past decade, cardiovascular diseases have been the most important and common cause of death worldwide, and it is predicted that by 2030, more than 23

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million deaths due to cardiovascular disease will occur worldwide each year (8). In addition, these diseases are the cause of nearly 40% of deaths due to non-communicable illness in people under 70 years of age (9). High prevalence of heart disease, high treatment costs and poor prognosis are some of the factors that cause anxiety and double stress for such patients (10).

Anxiety in patients can interfere with the proper follow-up of diets and recommended treatments and has a negative impact on self-care behaviors and treatment outcomes. The health maintenance process is through health promotion and disease management functions and is negatively affected in patients with high anxiety. Therefore, maintaining mental health and controlling anxiety in patients is very important (11).

Today conventional medication is no longer the best way to reduce patients' anxiety. Although these medications reduce anxiety, they have many side effects. For this purpose, there are many approaches, including the methods available in complementary medicine, through which we can help control patients' anxiety. Aromatherapy is one of the therapies that has been grown considerably in the majority of countries compared to other alternative medicine treatments. In aromatherapy, volatile oils derived from plants, which are natural chemical compounds, are used to promote health and cure diseases (12).

According to some researchers, during aromatherapy, plant odor can activate the olfactory nerve cells and eventually the limbic system, and nerve cells can provoke some neurotransmitters such as enkephalin, endorphins, noradrenaline and serotonin, depending on the form of odor, that can display quick effects on dropping anxiety and improving patient relaxation (13).

One of the aromatic essential oils of the plant that is widely used in aromatherapy is the oil derived from the lavender (*Lavandula angustifolia* L.), which belongs to the Lamiaceae family, a herbaceous, aromatic, and evergreen plant. This plant is one of the plants of arid and semi-arid regions. During growth, it needs a lot of light and hot, and humid air, and in most parts of the world, it grows wildling (14).

So far, many investigations have examined aromatherapy with lavender essential oil as a non-invasive nursing mediation in various conditions, e.g., the enhancement of anxiety after coronary angiography, surgery, hemodialysis, and decreasing cardiac factors (15). In recent years, a number of animal and human studies have reported anxiolytic, antinociceptive, sedative, and neuroprotective effects for lavender indicating lavender essential oil may be an effective agent in the treatment of various neurological disorders (16,17). In addition, most studies have shown the positive effects of lavender inhalation on reducing anxiety in heart patients (18-29). In this study we aimed to systematically review the role of aromatherapy with lavender in reducing the anxiety of patients with cardiovascular diseases.

## Methods

### Database search

Based on the PRISMA standards, we searched the words and terms of "aromatherapy", "lavender", "Lavandula", "anxiety", and "cardiovascular diseases" in important English databases of Scopus, PubMed, Web of Science, EMBASE, and Google Scholar without time frame to find the role of aromatherapy with lavender in reducing the anxiety of patients with cardiovascular diseases.

### Quality assessment and article selection

Initially, the papers were inserted into the EndNote X9 software and identical papers were omitted. Next, the authors surveyed the title and summary of the articles, and the related papers were included for more examination. After reading the papers, the qualified papers with reasonable inclusion criteria were nominated.

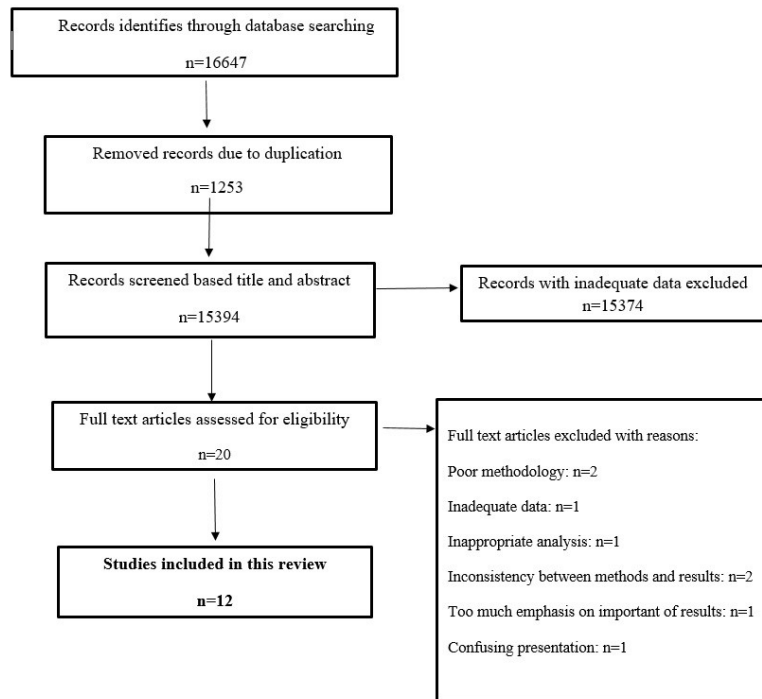
### Data extraction

Inclusion criteria of the present review were the clinical papers assessing the effects of lavender aromatherapy on the anxiety of patients with cardiovascular diseases. As exclusion criteria, the papers with inadequate data, those were just an abstract of the article, mismatch between study process and outcomes, and studies with irrational results and interpretation were excluded from the review. The obtained data in each selected paper included the type of study, control group, sample size (case/control), type of disease, measurement scale, dosage, intervention process, results, year, and references (Figure 1).

## Result and Discussion

Totally, 16 647 papers were recognized via databases. In the next step, 1253 papers were omitted because of repetition. From 15 394 remaining papers, 15 374 articles were discarded because of having exclusion criteria. Finally, a total of 12 papers up to January 2022 encountered the inclusion criteria for involving in this systematic review (Table 1). The majority of studies (7 studies, 70%) were used Spielberger Standard Questionnaire as a measurement scale for their studies. Lavender aromatherapy was mostly used for myocardial infarction (3 studies, 30%) and coronary artery bypass graft (CABG) surgery (3 studies, 30%).

Considering the effect of aromatherapy on reducing anxiety in patients undergoing coronary angiography (CA), in studies conducted by Teymouri et al (18), Ziyaeifard et al (28), and Panjalizadeh et al (29), the results showed that in patients undergoing coronary angiography (age between 25-84 years) with no history of addiction to drugs, allergy, and psychiatric illness, inhalation of 2 to 5 drops of lavender essential oil before or after coronary angiography considerably declined stress and anxiety compared to patients in the control group. Some other studies demonstrated that in patients with myocardial infarction (age range between 30-70), without any history



**Figure 1.** Flowchart of the study based on the PRISMA guideline.

of addiction to drugs, allergy, and psychiatric illness, 20-30 minutes inhalation of lavender essential oil (3 drops) three times/day for 3 days, significantly reduced stress and anxiety level as well as blood pressure in patients with myocardial infarction (22,24). Seifi et al (21), Rajai et al (25), and Hosseini et al (26) reported that in patients undergoing CABG surgery with no history of addiction to drugs, allergy and psychiatric illness, inhalation of 2 drops of lavender essential oil 20 min before surgery significantly decreased the heart rate and anxiety levels for patients before CABG.

Today, cardiovascular diseases have become one of the most important issues in the field of health due to their high prevalence and mortality (30). Due to the multifaceted nature of cardiovascular diseases, including deficiency proper diagnostic-therapeutic approaches and their results, treatment costs, and disability to return to work, these patients suffer a lot of anxiety (31, 32).

Anxiety affects endocrine and physiological responses and, in addition to increasing heart rate, respiration rate, decreased cardiac output, and increased myocardial oxygen demand, can cause ischemic pain (33). Therefore, decreasing the anxiety level in these patients should be considered as one of the important nursing-treatment priorities in order to care for them. Aromatherapy is a non-pharmacological therapy for reducing anxiety that has been widely considered today (11,12).

Lavender is one of the most fragrant medicinal plants whose essential oil is used in aromatherapy. This herb improves the heart function, motivates blood circulation, and is effective in making peace of mind. Lavender

essential oil is prepared from flowering branches or flowers by distillation or water vapor. It is a light-yellow liquid with a delicate and very pleasant smell. The majority of the constituents in lavender essential oil are linalool and linalyl acetate. These two active substances have anti-inflammatory and anti-anxiety effects and exert their therapeutic properties through the central nervous system. Linalool binds to the GABA receptor and inhibits it in the central nervous system to induce relaxation. Linalool reduces the activity of beta waves in the brain causing wakefulness. It also increases the activity of alpha wave causing calms and reduction of anxiety. In addition, *L. angustifolia* essential oil and its main component, linalool, is able to influence adenylate cyclase 1 (ADCY1) expression triggering some signal transduction paths, e.g., Erk/MAPK and PKA (34). Also, inhaling this essential oil can reduce the anxiety-related neurotransmitters, including epinephrine and norepinephrine (35,36).

We conducted the present study with the aim of reviewing the effect of aromatherapy with lavender essential oil on anxiety in cardiovascular patients. Most studies confirmed the positive effect of this strategy, and in some studies its positive role in reducing physical and psychological parameters anxiety was not proven.

## Conclusion

Clinical studies in recent years have confirmed that lavender aromatherapy is able to reduce anxiety disorders. Based on the studies mentioned in this review article, aromatherapy with lavender essential oil significantly ameliorates the anxiety signs in some cardiovascular

**Table 1.** List of included papers related to the effects of lavender aromatherapy on the anxiety of patients with cardiovascular diseases

Study	Control group	Sample size (case/control)	Type of disease	Measurement scale	Dosage	Intervention process	Results	Year	Ref
Teymuri et al (18)	Distilled water	70 (35/35)	Coronary angiography	Spielberger Standard Questionnaire	2 drops	20 min before and after procedure	After intervention, anxiety and stress was considerably declined.	2019	(18)
Heidari et al (19)	Distilled water	110 (55/55)	Acute coronary syndrome	Spielberger Standard Questionnaire	2 drops	30 min before procedure	A significant decrease was observed in depression and anxiety compared to placebo group	2020	(19)
Najafi et al (20)	None	68 (33/35)	Myocardial infarction	Spielberger Standard Questionnaire	3 drops	20 min/twice a day/two days	A significant decrease was observed in depression and anxiety compared to control group	2014	(20)
Seifi et al (21)	Distilled water	60 (30/30)	CABG surgery	Spielberger Standard Questionnaire	2 drops	20 min on the 2nd and 3rd day after surgery	Although aromatherapy decreased the anxiety, but no significant effect was reported compared to placebo group	2014	(21)
Ganjloo et al (22)	None	60 (30/30)	Myocardial infarction	Spielberger Standard Questionnaire	3 drops	20-30 min, 3 times a day for 3 days	The two groups were significantly different in terms of overt and covert anxiety after the intervention	2014	(22)
Moradi et al (23)	Distilled water	80 (40/40)	Cardiac ischemia	Spielberger Standard Questionnaire	2 drops	20 min during the second and third day of hospitalization	A significant decline was reported in depression and anxiety compared to placebo group	2015	(23)
Mirbastegan et al (24)	Distilled water	60 (30/30)	Myocardial infarction	Spielberger Standard Questionnaire	3 drops	30 min/3 times a day/3 days	A significant decline was reported in depression and anxiety compared to placebo group	2016	(24)
Rajai et al (25)	None	60 (30/30)	CABG Surgery	Depression Anxiety Stress Scale (DASS) questionnaire	2 drops	20 min before surgery	After aromatherapy, a significant decline was reported in anxiety compared to placebo group, but unsuccessful to decrease stress	2016	(25)
Hosseini et al (26)	Distilled water	90 (45/45)	CABG Surgery	Spielberger Standard Questionnaire	2 drops	20 min on the day of surgery	Patients' level of anxiety after the intervention showed a significant decrease	2016	(26)
Karadag et al (27)	None	60 (30/30)	Patients in coronary ICU	Beck Anxiety Inventory (BAI) scale	2 drops	2% essential oil, for 15 nights	Anxiety decreased significantly after the intervention	2017	(27)
Ziyaeifard et al 2917 (28)	Lorazepam	80 (40/40)	Coronary angiography	Spielberger Standard Questionnaire	5 drops	5 min	Anxiety decreased significantly after the intervention	2017	(28)
Panjalizadeh et al 2019 (29)	Oxazepam	80 (40/40)	Coronary angiography	Comparison based on modifications in blood pressure and heart rate	5 drops	5 min 12 hours and 30 minutes before angiography	No significant effect observed in anxiety between the intervention and control groups	2019	(29)

diseases such as MI, CABG, and cardiac ischemia. However, more studies are required in this field to obtain more specific evidence.

#### Authors' contribution

AA, YR, KK, PB, and MRG reviewed and contributed to data collection and preparation of the manuscript. The first draft was prepared by AA, and PB. All authors read the final version and confirmed it for publication.

#### Conflict of interests

The authors declared no competing interests.

#### Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication etc.) have been completely observed by the authors.

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