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The Effect of Lavender Essential Oil on Blood Pressure

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ABSTRACT

High blood pressure is a major risk factor for cardiovascular and kidney diseases. Lavender essential oil has gained attention as a complementary therapy due to its calming and possible antihypertensive effects. This review summarizes clinical and experimental evidence regarding its effectiveness in lowering blood pressure. A literature search was conducted in PubMed, Google Scholar, and Science Direct with inclusion/exclusion criteria focused on randomized and quasi-experimental trials. Findings suggest that lavender oil, through inhalation or massage, may help reduce systolic and diastolic blood pressure while improving psychological well-being. Further large-scale studies are needed to confirm its long-term efficacy and safety.

1. INTRODUCTION

High blood pressure (hypertension) is a chronic, non-communicable disease caused by persistently elevated blood pressure within arteries [1] and is considered a risk factor for cardiovascular disease, which ultimately leads to death and disability. Hypertension was defined as a systolic blood pressure (SBP) ≥ 130 mmHg and/or diastolic blood pressure (DBP) > 80 mmHg [2]. in 2017-2018, high blood pressure became prevalent among adults aged 18 and above, 51% among women, and 45.4% among men. There was a difference in the prevalence of the disease according to age, with those aged 18 - 39 years having a prevalence rate of 22.4%, whereas the prevalence of the disease was 54.5% among those aged 40 - 59 years, and the prevalence rate increased by 74.5% among those aged 60 years and above [3]. These rates represent a global increase in the disease risk. However, high blood pressure medication may be associated with side effects, including cough, weakness, sleep disorders, and symptoms of depression. However, long-term medication also has severe adverse effects [4]. Thus, alternative therapies may be helpful and beneficial for patients [5]. Aromatherapy and massage with lavender have seen increasing interest in medical circles as aids for managing blood pressure in individuals with hypertension [6]. Lavender, a plant from the Lamiaceae family that is native to North Africa and the Mediterranean, is widely cultivated in temperate regions. It is an essential oil extracted from flower stalks through distillation and is used in massage therapy to help reduce blood

pressure, anxiety, and chronic headaches [7].

A systematic review published in 2014 using massage as a complementary therapy alongside blood pressure-lowering medications yielded positive results for patients with high blood pressure, contributing to a more effective reduction in both systolic and diastolic blood pressure than using medications alone [7]. The current study also showed that legs treated with lavender oil showed a significant decrease in anxiety and an increase in alertness, which proved that lavender oil reduces the activity of beta waves in the brain, and in return, alpha waves in the cerebral cortex were stimulated, resulting in relaxation, alertness, and awareness [8]. on the other hand. The aromatherapy lavender contained four main components: linalool (22.1%), lavender acetate (15.3%), linalyl acetate (14.7%), and (E) beta-ocimene (10.4%) [9]. The essential oil responsible for the scent is linked to sensory receptors and sends nerve signals to the brain, which is the main center for controlling various functions of the body [10]. Currently, this treatment improves mood, alleviates wounds during surgery, relieves pain, provides support to women during childbirth, and relieves some types of incontinence. They also provide psychological and emotional support during healing [11, 12]. It is also important to improve and treat high blood pressure. A number of clinical studies have demonstrated that inhalation of lavender oil, either alone or in combination with other essential oils, can help lower blood pressure, reduce heart rate, and decrease cortisol levels and anxiety in individuals with hypertension [13, 14]. A recent study demonstrated the effectiveness of lavender oil patches in reducing blood pressure among individuals with hypertension, highlighting the convenience and practicality of this method as an accessible form of aromatherapy in daily life [10].

The focused research question of this review is: "What is the efficacy of lavender essential oil, administered via inhalation or topical application, in reducing blood pressure among hypertensive individuals compared to standard care or placebo?"

Another study showed that inhalation of lavender oil for 20 min reduced the heart rate and anxiety levels in patients before coronary artery bypass grafting (CABG). However, this intervention had no effect on stress levels or other physiological variables such as blood pressure and respiratory rate [15].

Despite the many benefits of aromatherapy, several challenges can affect its effectiveness and limit its use. This type of therapy often relies on inhalation or massage, which requires a suitable environment and sufficient time for application and may not be available to everyone. Additionally, it is difficult to precisely control the concentration of inhaled essential oils, which may lead to variations in therapeutic results or unwanted side effects.

2. METHOD

Computer searches were conducted in several medical databases, such as PubMed, Google Scholar, and Science Direct, to identify published studies and review the literature on aromatherapy (lavender). Five terms were used: hypertension, lavender, aromatherapy, massage, and the hypertension index. The number of studies from 2015 to 2025 was limited to at least ten years. The selection was based on clinical trials and their description of aromatherapy trials involving human patients. Studies that lacked a control group, were not randomized, or involved physically and psychologically healthy participants were excluded. Eligible studies had to report the duration of lavender oil intervention (minimum one week), specify dosage and delivery method (inhalation or massage), and include adult hypertensive patients.

The inclusion criteria were: 1) clinical trials involving human participants with diagnosed hypertension, 2) studies published between 2015 and 2025, 3) studies that included lavender oil intervention for at least one week, and 4) reported outcomes related to systolic or diastolic blood pressure. Exclusion criteria included: 1) studies without control or comparison groups, 2) animal or in vitro studies, 3) non-English publications, and 4) studies without full-text access.

The diagram **Figure 1** summarizes the steps followed in identifying and selecting studies for this review. A total of 356 records were initially identified through database searches. After removing duplicates, 310 records were screened based on titles and abstracts. Out of these, 250 were excluded. Sixty full-text articles were assessed for eligibility, and 35 were excluded for not meeting the inclusion criteria. Finally, 25 studies were included in the qualitative synthesis.

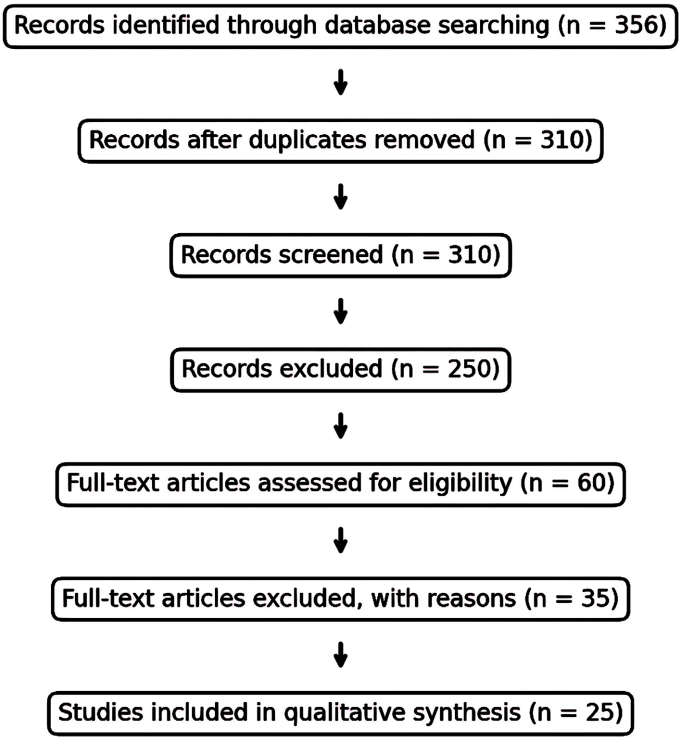

Figure 1. PRISMA flowchart showing the study selection process for the systematic review.

3. RESULT

A systematic quality assessment of the included studies was conducted using the Cochrane Risk of Bias tool. This included evaluation of selection bias, performance bias, detection bias, attrition bias, and reporting bias. A summary table presenting the quality scores of each study was compiled (Table 1). The reviewed studies were grouped by method of administration—either inhalation or massage—to allow clearer comparison of outcomes.

Table 1. Quality assessment of included clinical trials using the Cochrane Risk of Bias tool.

Study	Selection Bias	Performance Bias	Detection Bias	Attrition Bias	Reporting Bias
Meha *et al.* (2024) [6]	Low	Low	Unclear	Low	Low
Can Çiçek *et al.* (2022) [14]	Low	High	Unclear	Low	High
Can Çiçek *et al.* (2022) [14]	Unclear	Low	Low	High	Low
Napavichayanun *et al.* (2024) [10]	Low	Low	Low	Low	Low
Freeman *et al.* (2019) [11]	High	Unclear	Unclear	High	Unclear

Lavender oil is one of the most prominent essential oils used because of its calming properties and its potential effects on the autonomic nervous system. It is considered a promising field for supporting the control of chronic diseases, especially high blood pressure. As shown in Table 2, the following table provides a summary of the most prominent studies published between 2015 and 2024, focusing on their main findings.

Table 2. **Summary of relevant studies (2015-2024) on lavender oil's effects on hypertension.**

Researchers and year	Study title or topic	Main finding
Arshad Muhammad Iqbal; Syed F. Jamal (2023) [1]	Essential hypertension	Overview of hypertension, its causes, and treatment from a modern perspective.
Gupta R, Xavier D (2018) [2]	Hypertension risk in Indian population	Blood pressure is the most important contributor to non-communicable disease in india, with a need for improve prevention and treatment.
Ostchega Y *et al.* (2020) [3]	Hypertension prevalence in US adults	National data show that 45% of adults have hypertension.
Khalil H, Zeltser R (2023) [4]	Antihypertension medications	A detailed review of the type of blood pressure medications, their effects, and mechanism of action.
Meha *et al.* (2024) [6]	Lavender oil leg massage and hypertension	Massaging the legs with lavender oil significantly improved blood pressure, reduced anxiety, and improved concentration.
X. J. Xiong, S. J. Li, and Y. Q. Zhang (2015) [7]	Massage therapy for essential hypertension	Regular massage help lower baseline blood pressure remarkably effectively.
Freeman M *et al.* (2019) [11]	Aromatherapy and essential oils	Lavender has been described as a promising oil for reducing stress, with encouraging preliminary evidence.
Maddocks W (2023) [13]	Aromatherapy in nursing and midwifery	A review of studies highlights the use of lavender in healthcare to improve psychological well-being.
Radulescu *et al.* (2004) [16]	Phytochemical composition of lavender	Lavender oil is rich in antioxidants and has anti-stress and anti-vasculitis properties.
Can Çiçek *et al.* (2022) [14]	Lavender inhalation and hypertension.	Inhaling lavender twice daily reduced blood pressure and anxiety without side effects.
Can Çiçek *et al.* (2022) [14]	Inhalation and massage with lavender	It led to lower blood pressure, cortisol and improve mood.
Potempa *et al.* (2022) [5]	Health equity and NCDs in Thailand.	The study focused on public health challenges with the prevalence of stress and the important of alternative interventions.

Continued

Xiong XJ *et al.* (2015) [7]	Massage therapy for hypertension	A systematic review confirms the effectiveness of massage in reducing stress as a therapeutic complement.
Napavichayanun *et al.* (2024) [10]	Lavender & Ylang-Ylang on BP (RCT)	Using patches with essential oils effectively reduced blood pressure in volunteers without complications.

4. DISCUSSION

The findings of this review suggest that lavender essential oil, when administered through inhalation or massage, may contribute to lowering blood pressure and reducing anxiety in individuals with hypertension. These outcomes are consistent with results from several clinical studies. For instance, lavender oil inhalation was shown to significantly reduce systolic and diastolic blood pressure in a randomized controlled trial [10]. In a similar study, lavender oil leg massage resulted in significant improvements in both blood pressure and psychological well-being [6].

Mechanistically, the active compounds in lavender oil, particularly linalool and linalyl acetate, are known to affect the autonomic nervous system. They reduce sympathetic activity while enhancing parasympathetic responses, leading to a more relaxed state, lower heart rate, and reduced blood pressure. These compounds may also have antioxidant effects that protect vascular function [13, 14].

However, this review also identified several limitations in the current literature. Many studies had small sample sizes, short intervention durations, and lacked blinding or control groups. Additionally, the variability in lavender oil dosage, administration method, and patient characteristics make it difficult to generalize the results. Most studies did not examine the effects by sex, age, or baseline hypertension severity.

Despite these limitations, lavender oil remains a promising complementary approach for hypertension management. Its accessibility and low risk profile make it an attractive adjunct to conventional therapies. However, large-scale, well-designed randomized controlled trials with standardized protocols are needed to confirm efficacy, determine ideal dosage, and evaluate long-term safety.

5. CONCLUSIONS

This review supports the potential role of lavender essential oil as a complementary approach for managing hypertension, especially through non-invasive methods like inhalation and massage. While several studies indicate promising results, limitations such as small sample sizes, methodological variability, and lack of standardization affect the strength of the evidence.

The biological plausibility, supported by lavender's active components and their effects on the nervous and cardiovascular systems, provides a basis for further clinical exploration. Future studies should focus on defining optimal application protocols and assessing long-term safety, ideally within diverse populations.

6. RECOMMENDATION FOR FUTURE STUDIES

Future studies should be conducted to investigate the safety of using lavender oil with blood pressure medication and whether there are any side effects or drug interactions. Large-scale clinical studies should be conducted to monitor the effect of the continuous use of lavender oil on patients with high blood pressure, taking into account different age groups.

Standardization is essential for future studies. Researchers should use consistent concentrations and sources of lavender oil, delivery methods (e.g., duration and mode of inhalation or massage), and standardized outcome measures for systolic and diastolic blood pressure. It is also recommended to investigate the

underlying mechanisms of lavender's effects on cardiovascular regulation, such as through modulation of autonomic nervous system activity or hormone levels like cortisol.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest regarding the publication of this paper.

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