



## POTENTIAL APPLICATIONS AND ACTIVE SUBSTANCES OF LAVENDER ESSENTIAL OIL AS AN ANTI-HYPERTENSION: NARRATIVE LITERATURE REVIEW

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### ABSTRACT

Hypertension is one of the Cardiovascular Diseases (CVD) which is the highest cause of death, and current treatment has many side effects that can be life-threatening, so researchers are interested in providing safe treatment solutions. One of them is traditional medicine such as aromatherapy. Therefore, it is necessary to carry out narrative research in the literature reviewing the effectiveness of lavender aroma therapy in reducing blood pressure in hypertensive patients. This research uses a Narrative Review study approach which focuses on evaluating several previous research results related to the topic. Based on data used by Google Scholar, Pubmed, and Spinger between 2019 and 2024. A total of 1,394 articles were found in the initial search stage, after filtering based on title, keywords and abstract this was reduced to 10 articles. And finally only 4 articles were selected that fit the criteria. There were 2 types of lavender aromatherapy applications, namely topical and inhalation. As well as two anti-hypertension active substances, namely linalool and linalool acetate. Lavender aromatherapy is effective in lowering blood pressure in hypertensive patients. The mechanism of reduction can be explained by the active anti-hypertensive substance (linalool & linalool acetate) and its application (inhalation & topical). However, further research with better designs is still needed.

Keywords: aromatherapy; hypertension; lavender

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### INTRODUCTION

Cardiovascular disease is a non-communicable disease which is one of the highest causes of death in the world. Nearly 17.5 million people die each year from cardiovascular disease (CVD), which is estimated to account for 31% of all deaths worldwide, this figure is expected to increase to more than 23.6 million in 2030 (Roth et al., 2018)(Hajar, 2016). Data from the Indonesian Ministry of Health in 2018 shows an increase in hypertension rates of 8.2% compared to the previous year. Meanwhile, hypertension sufferers in DIY reached 34.1% and in Bantul Regency it was 29.89% (Dasar, 2018). Apart from that, the Bantul I Community Health Center area has 1,505 patients, which is the largest number of hypertension patients recorded (Dinkes Kabupaten Bantul, 2019).

Cardiovascular diseases that often occur are hypertension, acute myocardial infarction, heart failure, arrhythmia, coronary artery disease, atherosclerosis and stroke (Kapuku & Kop, 2022). Several risk factors have been associated with the pathogenesis of CVD, including

metabolic disorders, such as hyperlipidemia and diabetes mellitus (Labarthe, 2012). In an effort to reduce the burden of cardiovascular disease worldwide, WHO member countries have attempted to offer treatment and counseling to at least 50% of individuals aged 40 years and at high risk of cardiovascular disease (Organization, 2016).

Several drugs are often used to treat cardiovascular problems such as anticoagulants, antihypertensive drugs, beta-blockers, ACE inhibitors, angiotensin receptor blockers, thiazide diuretics, statins, and psychiatric drugs. These drugs can cause side effects and interactions that may be life-threatening or affect quality of life such as muscle disorders, rhabdomyolysis, ulcers, internal bleeding, kidney failure, increased risk of heart attack and stroke, and cardiotoxicity. So it is important to understand and manage the risks and side effects of cardiovascular drugs to reduce mortality and morbidity associated with side effects (Ghosh et al., 2015)(Dieterle, 2015). Side effects and long treatment times make patients dissatisfied with modern medicine, so WHO encourages the application of traditional medicine(Organization, 2019).

Traditional medicine or what is currently known as Complementary Medicine (CM)/Alternative Medicine (AM) has proven to be effective in preventing disease, treating non-communicable diseases, and improving the quality of life of patients with chronic diseases (Bachtiar, 2021) (Kordafshari et al., 2017) (Al-Bedah et al., 2019) (Irmak et al., 2019). Several types of complementary medicine that have been implemented in health services as a companion to modern medicine for CVD patients include cupping (KĪANĪ et al., 2022) (Setyawan et al., 2020)(Widada et al., 2018) aroma therapy (Mohamadinasab et al., 2019) (Setyawan et al., 2022), murotal therapy (Kurniawati & Bungsu, 2021), herbs (Waznah et al., 2019) and reflexology(Kotruchin et al., 2021). One of the preferred complementary therapies is aromatherapy because it offers a natural and safe healing approach, without the risk of severe side effects or drug interactions (Tripathi et al., 2023). In addition, aromatherapy with essential oils (EO) is able to change the structure of the stratum corneum, thereby increasing the transdermal permeation of active ingredients (Koyama & Heinbockel, 2020). Essential oils used in aromatherapy contain bioactive ingredients that can selectively bind to certain targets in the body, thereby influencing physiological processes. Aromatherapy using EO has also been proven to have various therapeutic uses, including relieving depression (Setyawan & Oktavianto, 2020)(Setyawan et al., 2021), pain (Reyes et al., 2020) and hypertension (Mohamadinasab et al., 2019).

Lavender oil has been used for a long time as a type of treatment because of its calming, sleep-inducing properties, anxyolitic (anti-anxiety) effects, and other psychological effects (Setyawan et al., 2022)(Tayebi et al., 2015)(Seifritz et al., 2019) (Zhang & Yao, 2019). This is in accordance with the effect of giving lavender aromatherapy on reducing anxiety in coronary patients (Karadag & Baglama, 2019) hemodialysis patients (Tayebi et al., 2015) during labor (Lamadah & Nomani, 2016) Patients Undergoing Coronary Artery Bypass Graft Surgery (Rajai et al., 2016). Apart from that, lavender aroma therapy is also often used as a complementary therapy in CVD patients to improve blood pressure and heart rate (Ariafar et al., 2022). The main ingredient in lavender is linalool which has anti-hypertensive effects (Camargo et al., 2018). Based on descriptions from several literatures, hypertension is one of the highest causes of death, and current treatment has many side effects that can be life-threatening, so researchers are interested in providing safe treatment solutions. Thus, it is necessary to carry out narrative literature research reviewing the effectiveness of lavender aroma therapy in reducing blood pressure in hypertensive patients.

## METHOD

This research uses a Narrative Review study approach which focuses on evaluating several previous research results related to the topic.

### *Literature Search Strategy*

The literature sources used in this research were searched via Google Scholar, Pubmed, and Spinger using the English keywords "People with Hypertension" AND "Essential Oil Lavender" OR "Aromatherapy Lavender"

### *Inclusion and exclusion criteria*

The selection of literature was taken based on journal criteria that were able to answer questions related to the research objectives. The criteria for filtered articles are based on literature title, abstract and keywords. The articles were then filtered again by looking at the entire text. Screening of reference lists from journals or articles taken based on research in the last 5 years, namely between 2019 and 2024. The inclusion criteria for this study were (1) articles that were explicitly related to lavender aromatherapy (2) an article discussing lavender aromatherapy for hypertension (3) original research articles (4) publications published between 2019-2024, (5) English language articles, and (6) full text availability with free access.

## RESULTS

### *Literature search*

A total of 1,394 articles were found in the initial stage of the search, after filtering based on title, keywords and abstract this was reduced to 10 articles. And finally only 4 articles were selected that met the criteria. The literature search is explained in Figure 1.

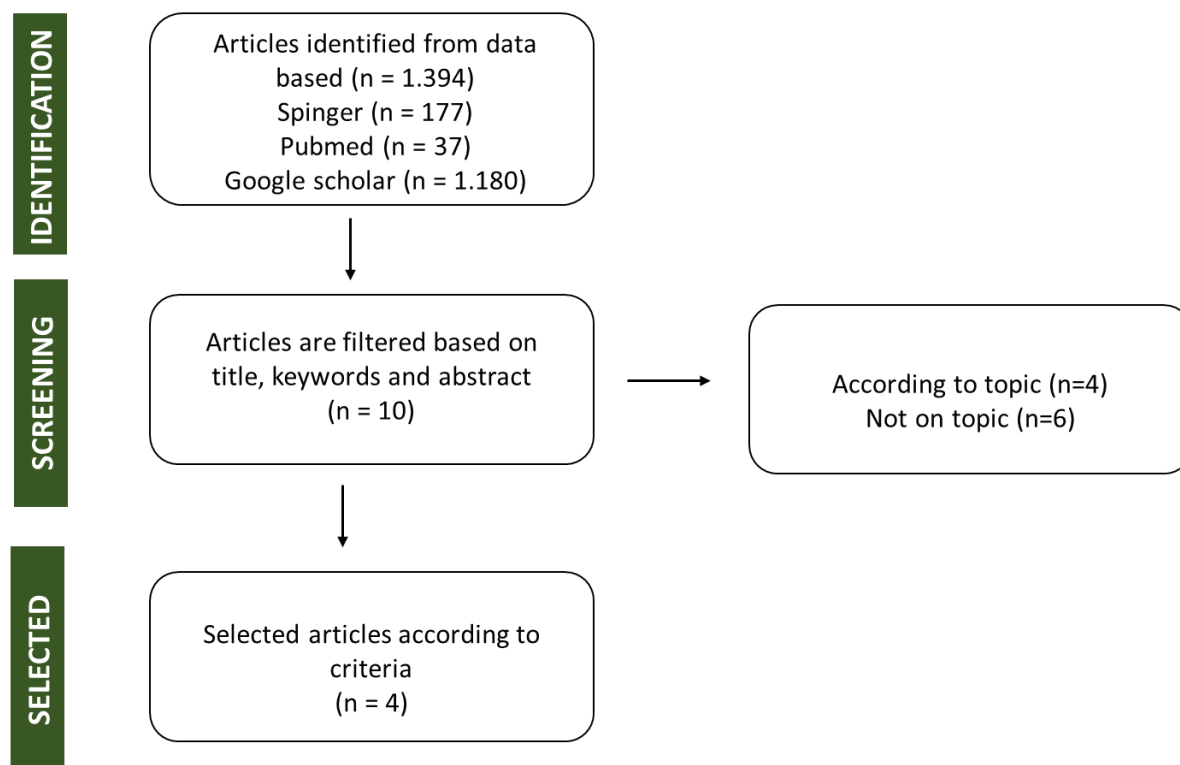


Figure 1. PRISMA

Table 1.  
List of search result articles

Title and Author	Research methods and samples	Method of application, dosage, duration and type	Result
The Effectiveness of Lavender Aromatherapy on Blood Pressure among Elderly with Essential Hypertension (Rahmadhani, 2022)	Pre-experiment (pretest – posttest without control group) with 15 samples	Inhalation method, using a diffuser, dose 5-6 drops, 2 times therapy. Lavender	There is a significant influence giving lavender aromatherapy to blood pressure of hypertensive patients, p value <0.05; systole (p = 0.001) and diastole (p < 0.001).
Effect of nutmeg and lavender essential oil on blood pressure in the elderly with hypertension (Nugraha et al., 2020)	Pre-experiment (pretest – posttest without control group) with 35 samples	The inhalation method uses a diffuser for 7 days. Every day 30 minutes. Lavender and nutmeg	There was a significant reduction in blood pressure with a p value <0.05.
The Effect of Lower Extremity Massage with Lavender Essential Oil on Decreasing Blood Pressure in Elderly with Hypertension in UPTD Griya Werdha Surabaya (Maulana et al., 2019)	Pre-experiment (pretest – posttest without control group) with 13 samples	Topical method with a combination of massage. Done once. Lavender and massage	There was a significant reduction in blood pressure with a p value <0.05.
The Effects of Slow Stroke Back Massage and Lavender Aromatherapy on Blood Pressure in Hypertensive Patients (Sani & Irdianty, 2020)	Pre-experiment (pretest – posttest without control group) with 40 samples	Topical method with a combination of massage. Done once. Lavender and massage	There was a significant reduction in blood pressure with a p value <0.05.

## DISCUSSION

Based on studies from several articles, aromatherapy or lavender essential oil is effective in lowering blood pressure in hypertensive patients. The effectiveness of lavender aromatherapy in lowering blood pressure can be explained through two mechanisms, namely, the main content of lavender and the application method.

### *Lavender essential oil content*

Lavender oil has several ingredients such as monoterpene hydrocarbons, camphene, limonene, geraniol lavandulol, nerol and mostly contains linalool and linalool acetate with amounts of linalool (9.3 to 68.8%) and linalyl acetate (1.2 to 59.4%) of the total weight of oil (Batiha et al., 2023). Linalool has activity as an anxyolytic (anti-anxiety), so it can provide a relaxing effect through the olfactory nerve (De Sousa et al., 2015)(Harada et al., 2018).

Meanwhile, Linalool acetate has been reported to have various therapeutic properties, including analgesic (Yu & Seol, 2017), anti-psoriatic (Rai et al., 2020) and antibacterial (Ramić et al., 2021). Apart from that, Linalool acetate is also effective in preventing hypertension(Hsieh et al., 2019)(Hsieh et al., 2018) (Shin & Seol, 2023) and diabetes mellitus(Shin et al., 2020). In a recent study, linalool acetate showed antioxidant and anti-inflammatory properties, as well as the ability to treat endothelial dysfunction which is the cause of hypertension (Batiha et al., 2023).

### **Lavender aromatherapy application method**

The application of essential oils in the body will depend on the pathway by which the molecules are administered, which can occur through inhalation, ingestion or the dermal route. There are 2 methods of aromatherapy application, namely

### ***Inhalation method***

The most common methods of administering aromatherapy are inhalation (directly or by diffusion) and topical application, sometimes through massage (Lindquist et al., 2018). Lavender oil administered by inhalation is effective for increasing attention and reducing anxiety, providing relaxation, and leading to a reduction in physical parameters of the autonomic nervous system such as pulse rate, respiratory rate, and blood pressure (Nugraha et al., 2020) (Setyawan et al., 2022). Aromatherapy by inhalation is effective because, when the oil enters the body through inhalation, the molecules stimulate the olfactory pathways that are closely connected to parts of the brain's limbic system, which influences heart rate, blood pressure, breathing rate, memory, and hormone levels (Setyawan & Oktavianto, 2020). The limbic system includes the brain's amygdala, which plays a major role in reactions such as fear and anger, and becomes particularly active during emotional trauma.

Apart from that, the use of aromatherapy by inhalation will accelerate the inhibitory effect of Monoamine Oxidase which plays a role in restoring the balance of neurotransmitters (serotonin, norepinephrine and dopamine) so that it can improve mood. Some compounds that can inhibit Monoamine Oxidase are eugenol, linalool, and benzyl benzoate (Zhang & Yao, 2019). When essential oil molecules are inhaled, they traverse the upper respiratory tract, reach the lower airways where they are absorbed by the pulmonary blood vessels and spread throughout the body via the bloodstream to organs and tissues.

### ***Topical method (transdermal)***

Currently, the Transdermal Drug Delivery System (TDDS) has been developed to increase the clinical effectiveness and safety of drug delivery in a more accurate and specific location (Hasan & Farooqui, 2021). One way is to apply essential oils via a topical method, namely through the skin. Topical application of essential oils is effective in lowering blood pressure (Sani & Irdianty, 2020) (Maulana et al., 2019). When administered via the skin, the molecules penetrate the skin or mucous membranes, where they are absorbed and distributed throughout the body's tissues via the bloodstream. This will have a good effect when applying lavender aromatherapy through the skin, because it can directly have a vasodilation effect on blood vessels, thereby reducing blood pressure. Essential oils have an important role in increasing transdermal drug delivery by influencing the fluidity of vesicular membranes (Sorathia et al., 2021). The ability of essential oils to penetrate the skin and influence drug release is currently very valuable in transdermal drug delivery systems, it can be a safe and effective alternative to increase drug permeation through the skin.

### ***Study Limitations***

This research has a number of limitations that should be taken into account. First, there is a chance that participant selection bias exists because four of the publications that were found did not employ a real experimental design. Consequently, more studies employing randomized control trials are required. Second, the target demographic for this research is solely Indonesian participants, suggesting that the applicability of the findings may be restricted to Indonesian society.

### **CONCLUSION**

Lavender aromatherapy is effective in lowering blood pressure in hypertensive patients. The mechanism of reduction can be explained by the active anti-hypertensive substance (linalool & linalool acetate) and its application (inhalation & topical). However, further research with better designs is still needed.

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