

# The effectiveness of lavender aromatherapy in managing labor pain

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## ABSTRACT

Labor pain is one of the most intense forms of acute pain experienced by women and can have significant physical and psychological impacts. Although pharmacological methods such as epidural anesthesia are effective in relieving pain, their use is associated with potential side effects and limitations in resources, particularly in healthcare facilities with restricted access. This study aims to evaluate the effectiveness of lavender aromatherapy in managing labor pain, as well as to review the methods of application, timing of administration, and associated psychological effects based on empirical evidence from various studies. This literature review analyzed 17 scientific articles employing various research designs, including randomized controlled trials (RCTs), quasi-experimental studies, comparative studies, and systematic reviews. Data sources were derived from both national and international journals relevant to the topic of lavender aromatherapy and labor pain. The findings indicate that lavender aromatherapy consistently reduces labor pain intensity, particularly when applied during the active phase of the first stage of labor. Additionally, it has anxiolytic effects that help alleviate maternal anxiety. Its combination with other techniques such as effleurage massage enhances analgesic efficacy by stimulating beta-endorphin production. Lavender aromatherapy also offers flexibility in its application methods, including inhalation, topical massage, and ambient diffusion. Lavender aromatherapy is a safe, effective, and easily implemented non-pharmacological approach to holistic labor pain management. It supports both the physical and emotional well-being of mothers throughout the childbirth process.

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## INTRODUCTION

Labor pain is a physiological condition commonly experienced by most women during childbirth (Pietrzak et al., 2023; Whitburn et al., 2019). Data show that approximately 85–90% of laboring women experience moderate to severe pain. Specifically, around 15% report mild pain, 35% experience moderate pain, 30% report severe pain, and 20% experience very severe pain (Cohen &

Friedman, 2024; Mousa et al., 2024). In Indonesia, about 15% of mothers face childbirth complications that may exacerbate the intensity of labor pain (Geltore et al., 2024; Rachmawati, 2012). Furthermore, unaddressed pain can lead to labor dystocia, with a reported prevalence of 1.1% in 2019 and 2020. Labor pain is typically caused by uterine contractions aimed at expelling the fetus, starting in the latent phase and intensifying as labor progresses. One study demonstrated that after the application of relaxation techniques, the average labor pain intensity score could be reduced to 5.77 (Beyliklioğlu & Arslan, 2019; Smith et al., 2018).

These facts highlight that labor pain is a significant experience for most mothers, with varying degrees of intensity that can impact the progress of childbirth, thus necessitating effective and appropriate pain management strategies. Effective pain management during labor is crucial for the well-being of both mother and baby. Although pharmacological analgesics are available, they may cause side effects and are not always suitable for all patients. Consequently, non-pharmacological approaches such as aromatherapy have gained attention as safe and effective alternatives. Lavender (*Lavandula angustifolia*) is well-known for its relaxing properties and has been used in various medical contexts to reduce anxiety and pain (Beyliklioğlu & Arslan, 2019). Quantitative measurements of labor pain using tools such as the Visual Analog Scale (VAS) or Numeric Rating Scale (NRS) indicate that pain intensity is significantly higher during the active phase compared to the latent and second stages, with pain scores rising sharply from mild-to-moderate levels (around 3–5) in the latent phase to moderate-to-severe levels (around 7–9) in the active phase. Since pain peaks during the active phase, effective pain management interventions are especially critical at this stage to enhance maternal comfort and support the progress of labor. Therefore, aromatherapy—particularly with lavender, known for its relaxing and analgesic properties—is best focused on the active phase as a safe and effective non-pharmacological method to reduce anxiety and pain perception without side effects, thereby optimizing pain relief during childbirth.

Several studies have evaluated the effectiveness of lavender aromatherapy in managing labor pain (Caballero-Gallardo et al., 2025; Patil et al., 2022). For instance, a meta-analysis involving 14 randomized controlled trials found that aromatherapy—including the use of lavender oil via inhalation and massage—significantly reduced labor pain intensity in 11 of the 14 studies analyzed. Another study revealed that inhaling lavender essential oil during labor significantly decreased pain levels compared to the control group (Azmi et al., 1999; Žuškin et al., 2008). Additionally, aromatherapy massage with lavender oil was found to be more effective in reducing labor pain than massage without aromatherapy. However, while these findings are promising, some studies show mixed results. This pain is primarily caused by uterine muscle contractions aimed at helping to expel the fetus through the birth canal. The intensity of the pain increases as labor progresses, from the latent phase to the active phase and stage II. Poorly managed pain can affect both the physical and psychological condition of the mother, increasing the risk of fatigue, stress, muscle tension, and even slowing down the progress of labor, which may lead to medical interventions such as induction or cesarean section (Chadwick et al., 2021; Linton & Shaw, 2011).

To address this, various pain management methods have been applied. Pharmacological approaches, such as the use of analgesics and epidural anesthesia, have proven effective but come with risks of side effects, limited resources, and high costs, especially in areas with limited healthcare facilities. Therefore, non-pharmacological methods have become increasingly popular as alternative options. One such approach is lavender aromatherapy, derived from the essential oil of lavender flowers (*Lavandula angustifolia*), which has long been used as a complementary therapy to provide relaxation, reduce anxiety, and alleviate pain perception. Recent studies show that inhaling lavender aromatherapy during labor can significantly reduce pain intensity scores and provide a calming psychological effect on laboring mothers. Aromatherapy is also non-invasive, easy to apply, and carries minimal risk. Given its potential and safety, further exploration into the effectiveness of lavender aromatherapy as a holistic strategy for labor pain management is essential

## RESEARCH METHOD

This study employs a systematic review design to analyze and describe the effectiveness of lavender aromatherapy in managing labor pain. The inclusion criteria for this review are scientific articles published in English or Bahasa Indonesia, available in full text, and focusing on the use of lavender aromatherapy to reduce pain intensity, anxiety, or improve the overall childbirth experience. Both quantitative and qualitative studies were included. A comprehensive literature search was conducted using Google Scholar and PubMed databases. The following keywords were used in both English and Indonesian: “lavender aromatherapy” AND “labor pain management” and “aromaterapi lavender” AND “nyeri persalinan”. The search was limited to articles published between 2013 and 2024 to ensure data relevance and recency. Retrieved articles were organized using reference management software, and duplicates were excluded. Articles were screened based on titles and abstracts for relevance and reviewed in full to assess eligibility. Data extracted included authorship, year of publication, study location, design, sample characteristics, type of intervention, outcome measures, and main findings. Descriptive analysis was used to identify trends and variations in the application of lavender aromatherapy for labor pain management. The findings are presented narratively, highlighting how lavender aromatherapy, through inhalation or topical application, can significantly reduce labor pain intensity, provide emotional relaxation, and improve maternal satisfaction during childbirth. When reviewing various study designs such as RCTs, quasi-experiments, and systematic reviews, this review maintains validity by applying strict inclusion criteria, comprehensive literature searches, and consistent data extraction. By combining quantitative and qualitative studies and using narrative synthesis, findings from diverse methodologies are integrated despite methodological heterogeneity. Limiting publication dates and removing duplicates also help ensure relevance and reduce bias. Thus, the review can draw valid conclusions even with a variety of study designs included.

## RESULTS AND DISCUSSIONS

A total of 421 articles were obtained from two databases, EBSCO and Google Scholar, focusing on the use of lavender aromatherapy in managing labor pain. These articles were then screened, and 96 duplicate entries were removed. Additionally, 240 articles were excluded due to incomplete information or unclear publication years. Next, eligibility assessment was conducted based on the full text and inclusion criteria. A total of 1 article did not meet the criteria, leaving 49 articles suitable for inclusion in this review. The article selection process and results are shown in the PRISMA Flow Diagram (Figure 1). A synthesis of the 18 eligible articles was conducted, revealing three main themes: the effectiveness of lavender aromatherapy in reducing the intensity of labor pain, the influence of aromatherapy on maternal anxiety and emotional well-being during childbirth, and the safety and feasibility of lavender aromatherapy as a non-invasive pain management technique. These themes emphasize the potential of lavender aromatherapy as a valuable complementary method in labor pain management, particularly for women who prefer non-pharmacological approaches. The review highlights how lavender aromatherapy can contribute to a more positive childbirth experience by providing pain relief, reducing anxiety, and improving maternal satisfaction. It also suggests the importance of further research to optimize protocols and explore its effectiveness in various clinical settings.

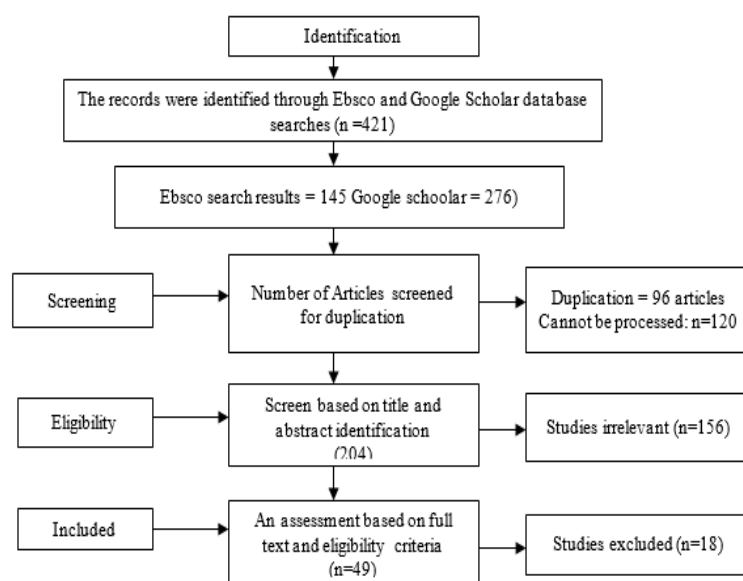


Figure 1. Prisma flow diagram

Based on 18 analyzed articles, including randomized controlled trials (RCTs), quasi-experimental studies, and systematic reviews, lavender aromatherapy has been shown to be effective when applied through inhalation, topical massage, or ambient diffusion. Lavender can also enhance the effectiveness of other techniques, such as effleurage massage, which stimulates the production of beta-endorphins to improve pain relief. Lavender aromatherapy provides a holistic approach that supports both the physical comfort and emotional well-being of mothers during the childbirth process. Below are 18 selected articles.

**Table 1.** Selected articles related to the study of the effectiveness of lavender aromatherapy on labor pain

No.	Author(s) & Year	Title	Method	Main Findings
1	(RAMBE & Imelda, 2022)	The Effect of Lavender Aromatherapy to Reduce Labor Pain: A Systematic Review	Systematic review of 10 journals	Lavender aromatherapy effectively reduces labor pain intensity
2	(Darmawan et al., 2022)	The Effect of Lavender Aromatherapy on Labor Pain During Active Phase at RS Lira Medika Karawang	Quasi-experiment, pretest-posttest	Significant pain reduction in the intervention group compared to control
3	(Karlina et al., 2015)	Effect of Inhaled Lavender Aromatherapy on Pain Intensity in Physiological Labor among Primiparous Women	Pretest-posttest without control group	Significant decrease in pain intensity after lavender aromatherapy
4	(Rshb et al., 2021)	Effectiveness of Lavender Aromatherapy on Reducing Labor Pain in RSHB Batam	Case-control study	Significant difference in pain levels between aromatherapy and control groups
5	(Sekar Pitaloka et al., 2024)	Effect of Lavender Aromatherapy Candles on Labor Pain During Stage I in PMB Yulia Tri Jayanti, Malang	Quasi-experimental with control group	Significant pain reduction in the aromatherapy group
6	(Cahya Skania et al., 2024)	Effectiveness of Lavender Essential Oil Aromatherapy on Reducing Labor Pain	Experimental study	Lavender essential oil is effective in reducing labor pain
7	(Kristo et al., 2021)	Effect of Lavender Aromatherapy on Labor Pain During Active Phase in Primigravida Women	Pretest-posttest experimental	Significant pain reduction after lavender aromatherapy

No.	Author(s) & Year	Title	Method	Main Findings
8	(Adams et al., 2015)	Effectiveness of Lavender Aromatherapy on Labor Pain and Anxiety in Primipara Women	Thesis	Lavender aromatherapy effectively reduces pain and anxiety during labor
9	Widayani (2016)	Lavender Aromatherapy Reduces Perineal Pain in Postpartum Mothers	Journal article	Significant reduction in perineal pain after lavender use
10	(Manaf et al., 2020)	The Effect of Lavender and Rose Aromatherapy on the Intensity of Active Phase Childbirth Pain	Experimental study	Lavender and rose aromatherapy effectively reduced labor pain intensity during the active phase
11	(Karatopuk & Yarıcı, 2023)	Determining the Effect of Inhalation and Lavender Essential Oil Massage Therapy on the Severity of Perceived Labor Pain in Primiparous Women	Randomized controlled trial	Both inhalation and massage with lavender oil effectively reduced perceived labor pain
12	(Tanvisut et al., 2018a)	Efficacy of Aromatherapy for Reducing Pain During Labor: A Randomized Controlled Trial	Randomized controlled trial	Aromatherapy significantly reduced labor pain intensity compared to control group
13	(M & Andani, 2018)	Effect of the Combination of Lavender Aromatherapy and Effleurage with Breathing Relaxation on Pain Intensity During Labor among Primiparas	Comparative study	Combination of lavender aromatherapy and effleurage more effectively reduced labor pain than breathing relaxation alone
14	(Apyranti et al., 2017)	The Impact of Lavender Aromatherapy on Pain Intensity and Beta-Endorphin Levels in Post-Caesarean Mothers	Quasi-experimental study	Lavender aromatherapy reduced pain intensity and increased beta-endorphin levels post-cesarean
15	(Comm et al., 2020)	The Effect of Lavender Aromatherapy on Labor Pain Among Delivery Women	Quasi-experimental, post-test only control group design	Lavender aromatherapy significantly reduced labor pain during the first active phase of labor
16	(susilarini et al., 2017)	The Effect of Lavender Aromatherapy on Pain Control in the First Stage of Labor	Quasi-experimental, one-group pretest-posttest design	Lavender aromatherapy significantly reduced labor pain intensity during the first stage of labor
17	(Makvandi, 2016)	A Review of Randomized Clinical Trials on the Effect of Aromatherapy with Lavender on Labor Pain Relief	Systematic review and meta-analysis	Lavender aromatherapy via inhalation and massage significantly decreased labor pain; however, more rigorous RCTs are needed for conclusive evidence

Lavender aromatherapy can be administered via inhalation, room diffusion, or topical massage, each offering distinct benefits for labor pain relief and maternal comfort. Inhalation provides quick anxiety and pain reduction, room diffusion offers continuous ambient relaxation, and topical massage combines lavender's analgesic effects with physical touch for enhanced relief. Studies show that combining lavender with massage is more effective than single methods, suggesting synergistic benefits. Clinically, these flexible administration methods can be tailored to patient preferences and labor stages—especially during the active phase—to optimize pain management and emotional well-being, supporting holistic care during childbirth.

### Consistent Efficacy Across Study Designs

One of the most notable aspects of these studies is the uniformity in findings across different research methodologies. Studies employing systematic reviews (Rambe et al.,

n.d.) synthesized data from multiple clinical trials and concluded that lavender aromatherapy significantly reduces labor pain intensity. These systematic reviews provide a high level of evidence, reinforcing the credibility of lavender's analgesic effects. Moreover, randomized controlled trials (RCTs), which are considered the gold standard for evaluating treatment efficacy, further support this conclusion. For example, (Karatopuk & Yarıcı, 2023) demonstrated that both inhalation and topical application (massage) of lavender essential oil led to a significant decrease in labor pain among primiparous women. Similarly, (Tanvisut et al., 2018b) conducted an RCT that compared aromatherapy and a control group and found that lavender aromatherapy led to statistically significant pain relief during labor. Additionally, quasi-experimental and comparative studies Darmawan et al., (2022) consistently reported that lavender aromatherapy reduced labor pain intensity compared to control groups. These findings suggest that regardless of study design, lavender aromatherapy demonstrates a clear analgesic effect when used during labor.

### **Complementary Benefits in Combination Therapies**

Several studies explored the combined use of lavender aromatherapy with other non-pharmacological pain management techniques. This approach aligns with holistic obstetric care, which seeks to enhance pain relief through multiple complementary therapies. For instance, the combination of lavender aromatherapy and effleurage massage and found that this combination provided greater pain relief than breathing techniques alone. This suggests that lavender enhances the effectiveness of other relaxation methods, potentially leading to improved maternal comfort during labor. Similarly, (Apryanti et al., 2017) examined the effects of lavender aromatherapy on post-cesarean mothers and found that not only did pain intensity decrease, but beta-endorphin levels also increased. Beta-endorphins are natural painkillers produced by the body, indicating that lavender aromatherapy may influence the body's endogenous pain modulation system. This biochemical effect highlights the potential physiological mechanisms underlying lavender's analgesic benefits.

### **Psychological and Secondary Outcomes**

Beyond its analgesic properties, lavender aromatherapy also yields significant psychological benefits, particularly in reducing anxiety and promoting maternal well-being during the childbirth process. Anxiety during labor not only exacerbates pain perception but can also lead to complications in labor progression due to increased catecholamine release. In this context, (Adams et al., 2015) et al. (2015) demonstrated that lavender aromatherapy significantly reduced both pain and anxiety levels among primiparous women. These findings are crucial as they suggest that lavender not only addresses physical discomfort but also modulates psychological stressors that influence labor outcomes. Additionally, (Karlina et al., 2015) reported a significant reduction in perineal pain during the postpartum period, reinforcing the potential for lavender aromatherapy to extend its benefits beyond labor itself. Such effects imply a broader role for lavender in supporting maternal recovery and comfort during the immediate postnatal phase. Collectively, these studies affirm the dual impact of lavender aromatherapy in managing both somatic and emotional components of labor pain, which is essential in delivering holistic maternal care.

### **Timing and Labor Stage Relevance**

The effectiveness of lavender aromatherapy appears to be closely linked to the timing of its administration, particularly with respect to labor stages. Multiple studies, including those by Comm et al. (2020), underscore its efficacy when used during the active phase of the first stage of labor—a period often marked by intense uterine contractions and cervical dilation. These studies found that women who received lavender aromatherapy during this phase reported significantly lower pain scores compared to control groups. Furthermore, the mode of delivery and sensory exposure appear adaptable to the labor setting. For example, (Sekar Pitaloka et al., 2024) employed lavender aromatherapy candles as a non-intrusive method to diffuse lavender essential oils in the

labor room, achieving notable pain reduction. This supports the flexibility of lavender aromatherapy to be administered continuously or intermittently, either through direct inhalation, ambient diffusion, or topical application. These findings emphasize the importance of strategic timing and practical delivery methods to optimize therapeutic outcomes during the labor process.

## CONCLUSION

The collective evidence from the reviewed studies strongly supports the efficacy of lavender aromatherapy in reducing labor pain, demonstrating consistent results across diverse research methodologies including systematic reviews, randomized controlled trials (RCTs), quasi-experimental designs, and comparative studies. This uniformity across designs affirms the robustness and reliability of lavender's analgesic properties. Notably, lavender aromatherapy has also shown enhanced effectiveness when combined with other non-pharmacological interventions, such as effleurage massage, indicating its potential as a synergistic component in holistic labor care. The combination not only improves physical comfort but may also stimulate endogenous biochemical responses, such as increased beta-endorphin levels, that contribute to natural pain relief. In addition to physical benefits, lavender aromatherapy exhibits significant psychological effects, particularly in reducing anxiety and enhancing maternal emotional well-being during labor. These dual somatic and psychological outcomes highlight its role in comprehensive obstetric care aimed at improving the overall childbirth experience. Furthermore, the timing of application—especially during the active phase of the first stage of labor—has been shown to be critical for maximizing analgesic effects. The versatility in delivery methods, from inhalation and massage to ambient diffusion via candles, makes lavender aromatherapy highly adaptable to various clinical and home birth settings. The collective evidence from the reviewed studies strongly supports the efficacy of lavender aromatherapy in reducing labor pain, demonstrating consistent results across diverse research methodologies including systematic reviews, randomized controlled trials (RCTs), quasi-experimental designs, and comparative studies. This uniformity across designs affirms the robustness and reliability of lavender's analgesic properties. Notably, lavender aromatherapy has also shown enhanced effectiveness when combined with other non-pharmacological interventions, such as effleurage massage, indicating its potential as a synergistic component in holistic labor care. The combination not only improves physical comfort but may also stimulate endogenous biochemical responses, such as increased beta-endorphin levels, that contribute to natural pain relief. In addition to physical benefits, lavender aromatherapy exhibits significant psychological effects, particularly in reducing anxiety and enhancing maternal emotional well-being during labor. These dual somatic and psychological outcomes highlight its role in comprehensive obstetric care aimed at improving the overall childbirth experience. Furthermore, the timing of application—especially during the active phase of the first stage of labor—has been shown to be critical for maximizing analgesic effects. The versatility in delivery methods, from inhalation and massage to ambient diffusion via candles, makes lavender aromatherapy highly adaptable to various clinical and home birth settings.

Despite strong and consistent evidence supporting the efficacy of lavender aromatherapy in reducing labor pain, several limitations should be acknowledged. The reviewed studies varied in methodology, including differences in sample size, aromatherapy duration, concentration and purity of lavender oil, and delivery methods, which limit the generalizability and comparability of results. Additionally, the absence of standardized intervention protocols across studies makes it challenging to establish clear clinical guidelines. Most research focused on primiparous women, with limited exploration of effects in multiparous or high-risk populations. Moreover, while some studies have reported synergistic effects when lavender aromatherapy is combined with other non-pharmacological techniques, such as effleurage massage, empirical evidence supporting these combinations remains limited and methodologically inconsistent. Future research should prioritize large-scale randomized controlled trials with standardized procedures to validate findings and

explore long-term effects on postpartum outcomes. Investigating the underlying biochemical mechanisms, such as beta-endorphin production, and assessing outcomes related to maternal satisfaction and neonatal health across diverse settings would further solidify the role of lavender aromatherapy in holistic labor care.

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