

Effect of essential sandalwood aromatherapy oil (*santalum album* L.) on intensity decreasing pain in the first stage of labor at Elliani Clinic

Farida Umamy¹, Ririn Anggriani Sitorus², Dewi Widya Wati³

^{1,2,3}Midwifery Study Program, STIKes As Syifa, Indonesia

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ABSTRACT

The traditional sandalwood plant is a producer of essential oils because of the distinctive nature of the heartwood and contains oil with a specific aroma. Sandalwood oil has several functions, including as an aromatherapy ingredient which is very beneficial for human health. Sandalwood oil can be used to cure stomach aches, skin ailments, kidney infections various inflammations, sedatives, pain relievers. This study was to determine the effect of giving sandalwood aromatherapy to the intensity of decreasing labor pain in the first stage of labor. This type of research used the Quasy Eksperimen method with pretest-posttest case control design in this study, the samples taken were mothers in the first stage of labor. 30 people. The sampling technique uses total sampling. Statistical test results using the uji t- paired sampel test. Analysis of the data obtained, namely the intensity of labor pain in the first stage before administration of sandalwood essential oil aromatherapy, the majority experienced severe pain intensity as many as 16 respondents (53,3%) and 14 respondents (46,7%) in the moderate category. While the intensity of labor pain in the first stage after administration of sandalwood essential oil aromatherapy, the majority experienced mild pain intensity as many as 18 respondents (60,0%), 10 respondents (33,3%) in the moderate category and respondents (6,7%) in the moderate category heavy. The results of the analysis showed that giving sandalwood essential oil aromatherapy proved effective in reducing the intensity of labor pain in the first stage of labor.

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Corresponding Author:

Farida Umamy,
Prodi Kebidanan,
STIKes As Syifa,
Jl. SKB/Pendidikan Kel.Kisaran Naga, 21219, Kab. Asahan, Indonesia
Email: f.umamy13@gmail.com

INTRODUCTION

Childbirth is a physiological process or the process of delivering a viable conception from the uterus to the outside world, allowing the mother to deliver her baby through the birth canal (Tiara Carolin et al., 2021)

According to the World Health Organization (WHO), Maternal Mortality Ratio (MMR) remains very high, with approximately 810 women dying from pregnancy and childbirth-related complications worldwide every day, and around 295,000 women dying during and after pregnancy and childbirth (Rusliana et al., 2023). The Maternal Mortality Ratio in developing countries reaches 462/100,000 live births, while in developed countries it is 11/100,000 live births (Umamy et al., 2023).

According to the results of the Indonesia Demographic and Health Survey (IDHS) in 2016, the Infant Mortality Rate (IMR) is 359/100,000 live births (Azkiya & Filda Fairuza, 2023). Unresolved childbirth pain is one of the causes of prolonged labor and fetal death (Zanah et al., 2022). Prolonged labor is a cause of maternal death in Indonesia, accounting for 5% of cases (Anjani et al., 2020).

Data released by the Directorate of Maternal Health Development in 2012 shows that maternal deaths in Indonesia are caused by several factors (Handayani et al., 2022). These factors include bleeding (30.1%), hypertension (26.9%), infection (5.6%), prolonged labor (1.8%), abortion (1.6%), and other causes (34.5%) (Handayani et al., 2022). Based on this data, prolonged labor is one of the contributing factors to Maternal Mortality Rate in Indonesia, albeit with a relatively small percentage (Miki & Pelrtasari, 2022)

The Indonesian Hospital Association's Data Center reported that during childbirth complications, 21% of mothers experienced severe pain, and 64% of mothers did not receive information about actions to reduce childbirth pain (Andarista, 2019). Factors influencing responses to labor pain include culture, emotions, anxiety and fear, childbirth experience, family support, and childbirth preparation (Hidayatullah & Rejeki, 2022). The increasing frequency and duration of labor pain can make mothers anxious, fearful, and tense, even leading to stress that results in the excessive release of hormones such as adrenaline, catecholamines, and steroids (Ristiani, 2022).

One of the basic efforts that can be made to reduce maternal mortality rate is by minimizing the childbirth pain experienced by mothers using non-pharmacological methods to reduce childbirth pain, such as aromatherapy (Desni Sagita et al., 2019). Severe labor pain can increase emotional stress in laboring mothers and may lead to fatigue, potentially impacting the normal function of uterine muscles during childbirth, which can result in delivery complications. Labor pain can also make women afraid of vaginal delivery, which is one of the reasons for the increasing rate of cesarean sections (Novita Nesi et al., 2021). Aromatherapy is a non-pharmacological therapy to reduce or alleviate pain in laboring mothers (Anggrayani et al., 2019). The gaps found in previous research that justified this study include the need for further investigation into the specific effects of sandalwood essential oil aromatherapy on pain intensity during the first stage of labor. While some studies have shown promising results regarding the effectiveness of aromatherapy in reducing labor pain, there remains a need for more focused research to fully understand the extent of its benefits and its potential as an alternative or complementary method for pain management during childbirth. Additionally, previous research may have lacked consistency or specificity in methodology, sample sizes, or outcome measures, highlighting the need for more rigorous and standardized studies in this area. Therefore, this study aims to address these gaps by providing more comprehensive and targeted insights into the efficacy of sandalwood essential oil aromatherapy in labor pain management.

Essential oils are a complex mixture of volatile compounds, produced as secondary metabolites in plants (Fitri Andini et al., 2023). Essential oils derived from sandalwood trees are obtained through direct steam distillation from the stem, branch, and root of sandalwood trees (Yuana et al., 2023). Before distillation, plants are treated such as cutting to facilitate oil extraction (Reltno Yuliani et al., 2018)

Traditional sandalwood trees are producers of essential oils due to the unique properties of their heartwood, which contains oils with specific aromas (Desni Sagita et al., 2019). The essential oil contained in sandalwood is a group of sesquiterpenoid compounds including alpha-santalol

and beta-santalol (Sukma et al., 2022). Sandalwood oil has functions including being an aromatherapy material that is very beneficial for human health (Siska M., 2019). Sandalwood oil can be used to treat stomachaches, skin problems, kidney infections, various inflammations, sedatives, pain relievers, and aromatherapy (Selptiani et al., 2020).

Based on the results of previous research conducted at Tidar Magelang Hospital, the respondents in this study were 20 groups of intervention and control laboring mothers. There was a significant difference in pain before and after sandalwood aromatherapy was administered. Sandalwood aromatherapy is effective in reducing labor pain (Andarista Siska, 2019).

In the study by (Anggrayani et al., 2023), it was found that there was a reduction in labor pain among primigravida mothers at PMB Malini, Sungai Sembilan District, Dumai City after being given aromatherapy with essential oils, with a p-value of 0.001 (<0.05), indicating a significant relationship. The conclusion drawn was that essential oil aromatherapy is effective in reducing labor pain among primigravida mothers at PMB Malini, Sungai Sembilan District, Dumai City, with a p-value of 0.001 (<0.05).

From the research results, it is shown that there is an effect on the perception of pain between the intervention and control groups, where mothers who were given lavender aromatherapy were better able to adapt to pain compared to those who were given controlled breathing. According to the researcher's assumptions, the implementation of Aromatherapy during the childbirth process affects the intensity of labor pain. Mothers who are given Aromatherapy during childbirth are better able to adapt to pain compared to those who are not given Aromatherapy during childbirth. The application of Aromatherapy during childbirth affects the level of labor pain (Fitri Andini et al., 2022).

Based on the initial survey conducted at the Elliani clinic, 5 pregnant women were interviewed, with 2 stating they experienced severe pain similar to their previous childbirth. Then, 3 laboring mothers reported experiencing very severe pain to the extent that they were traumatized to give birth again.

RESEARCH METHOD

This type of research uses the Quasi-Experimental method with a Case-Control pretest-posttest design. The population in this study is first-stage laboring mothers are 30. The sample size in this study is a total of 30 first-stage laboring mothers. The sampling technique in this study uses total sampling. This research was conducted from March to July 2023. The independent variable in this study is sandalwood aromatherapy on the intensity of reducing first-stage labor pain at the Elliani Clinic. Univariate analysis is used to describe the data conducted on each variable from the research results (Tiara Carolin et al., 2021a). Bivariate analysis is used to test the effect of sandalwood aromatherapy on the intensity of reducing first-stage labor pain. Statistical testing uses the paired t-test to determine the effect of the independent variable on the dependent variable. Ha: There is an effect of sandalwood essential oil (*santalum album* L.) aromatherapy on the intensity of reducing first-stage labor pain at the Elliani Clinic.

RESULTS AND DISCUSSIONS

This research was conducted on all respondents in this study, namely 30 first-stage laboring mothers at Elliani Clinic.

Table 1. The frequency distribution of respondent characteristics based on age, education, and parity can be seen in Table 1 below

No	Demografic Data	Frekuensi	%
1	Age		
	≤20 years	5	16,7
	21-35 years	22	73,3

No	Demographic Data	Frekuensi	%
	>35 years	3	10,0
	Total	30	100
2	Education Level		
	Elementary School	0	0,0
	Junior High School	8	26,7
	Senior High School	18	60,0
	Diploma / Bachelor's Degree	4	13,3
	Total	30	100
3	Parity		
	Primigravida	18	60,0
	Multigravida	12	40,0
	Total	30	100

Based on Table 1 shows the data of respondent characteristics based on age, education, and parity. Looking at the age, the majority of respondents are aged 21-35 years, totaling 22 respondents (73.3%). In terms of education level, the respondents mostly graduated from high school, with 18 respondents (60.0%). Regarding parity, the majority are primiparous, totaling 18 respondents (60.0%).

Univariate analysis is used to describe the data conducted on each variable from the research results. Bivariate analysis is used to test the effect of sandalwood aromatherapy on the intensity of labor pain reduction during the first stage of labor. Statistical testing uses a paired t-test to determine the effect of the independent variable on the dependent variable.

Table 2. Intensity of First-Stage Labor Pain Before Administration of Sandalwood Essential Oil Aromatherapy (*Santalum Album L.*) at Elliani Clinic

Intensity of Labor Pain	Frekuensi	%
Mild Pain (1-3)	0	0,0
Moderate Pain (4-6)	14	46,7
Severe Pain (7-10)	16	53,3
Total	30	100,0

Based on table 2, it shows that the intensity of first-stage labor pain before the administration of sandalwood essential oil aromatherapy, the majority experienced severe pain with 16 respondents (53.3%), and 14 respondents (46.7%) experienced moderate pain.

Table 3. Intensity of First-Stage Labor Pain After Administration of Sandalwood Essential Oil Aromatherapy (*Santalum Album L.*) at Elliani Clinic

Intensity of Labor Pain	Frekuensi	%
Mild Pain (1-3)	18	60,0
Moderate Pain (4-6)	10	33,3
Severe Pain (7-10)	2	6,7
Total	30	100,0

Based on table 3, it shows that the intensity of first-stage labor pain after the administration of sandalwood essential oil aromatherapy, the majority experienced mild pain with 18 respondents (60.0%), 10 respondents (33.3%) experienced moderate pain, and 2 respondents (6.7%) experienced severe pain.

Table 4. The Influence of Sandalwood Essential Oil Aromatherapy on the Intensity of Pain Reduction During First-Stage Labor

Intensity of Labor Pain	N	Average	Mean	t-value	p value
- Before	30	6,77	3,2	18,232	0,000
- After	30	3,57			

Based on table 4, it shows that the average reduction in intensity of first-stage labor pain before and after the administration of sandalwood essential oil aromatherapy is 3.20 (in the category of mild pain). These results indicate a decrease in the intensity of labor pain from severe to moderate to mild after the administration of sandalwood essential oil aromatherapy.

The research results before the administration of sandalwood essential oil aromatherapy showed that the majority of first-stage labor pain intensities were categorized as severe, with 16 individuals, and the minority experienced moderate pain, with 14 individuals.

Based on the age characteristics, it is known that the majority fall into the category of reproductive age, where with this healthy reproductive age, patients will be safer in facing childbirth because the body's organs can physiologically respond well to the process, including in terms of efficiency (thinning) and dilation (opening) of the birth canal (cervix/portio), as well as the response to the onset of uterine contractions (HIS). Based on educational characteristics, the majority have completed high school education. According to theory, higher education is closely related to the information obtained, especially regarding childbirth, so it is expected that with higher education levels, respondents can better manage pain. Furthermore, another characteristic found in this study is that the majority of respondents are primiparous. Primiparous patients tend to have higher anxiety compared to multigravida patients, as multigravida patients tend to have lower anxiety levels than primigravida patients. This anxiety can affect the mother's response to managing labor pain (Tiara Carolin et al., 2021).

The previous study focused on young women, aged between 18 and 25 years old. The results showed that aromatherapy significantly reduced the intensity of labor pain in this group. This study considered the number of pregnancies as a relevant factor. The results indicated that women with fewer pregnancies tended to experience greater benefits from aromatherapy in reducing labor pain compared to those who had experienced multiple pregnancies before (Norfitri elt al., 2022).

This study involved women of various age ranges, from teenagers to middle-aged women. Although it did not find significant differences in the response to aromatherapy based on age, the results indicated that the older age group may experience greater benefits. This study considered the number of pregnancies as a relevant factor. The results indicated that women with fewer pregnancies tended to experience greater benefits from aromatherapy in reducing labor pain compared to those who had experienced multiple pregnancies before (Hirza Rahmita et al., 2018).

The researchers in the current study may assume that the effects of aromatherapy on labor pain can vary depending on individual characteristics such as age and number of pregnancies. They may see that previous research provides a deeper understanding of how these factors can influence the response to aromatherapy. This assumption may encourage researchers to further consider how they design their studies, including sample selection and result analysis, to more accurately represent diverse populations in testing the effects of aromatherapy on labor pain.

Based on descriptive data, it is known that inhalation of sandalwood essential oil has been proven effective in reducing first-stage active labor pain (Norfitri elt al., 2022). The mean score before treatment was 6.77, which decreased to 3.57 after treatment, resulting in a pain score reduction of 3.20 points. This is because aromatherapy affects the hypothalamus in the nervous system, influencing neurochemistry to produce endorphins and serotonin, resulting in a positive response from the body to relax and cope with labor pain (Selptiani elt al., 2021)

The bivariate data analysis results showed that the average reduction in intensity of first-stage labor pain before and after the administration of sandalwood essential oil aromatherapy was 3.20 (in the category of mild pain). This indicates a decrease in the intensity of labor pain from severe to moderate to mild after the administration of sandalwood essential oil aromatherapy (Nuraini elt al., 2019)

Based on the results of the paired sample t-test, it is found that the p-value (0.000) is less than α (0.05), meaning that H_a is accepted. Therefore, it can be concluded that there is a significant

difference in the intensity of labor pain before and after the administration of sandalwood essential oil aromatherapy (Hirza Rahmita et al., 2018). This means that the administration of sandalwood essential oil aromatherapy is proven effective in reducing the intensity of first-stage labor pain at the Elliani Clinic.

The method of administering sandalwood essential oil aromatherapy involves measuring the intensity of pain using a numeric rating scale first, then mixing 3 drops of sandalwood essential oil with clean water, diffusing it in the room for approximately 15 minutes, and then conducting an evaluation (Kurniasari et al., 2017).

The administration of sandalwood essential oil aromatherapy is believed to stimulate brain cell activity in the amygdala similar to the way some tranquilizing drugs work. Other researchers believe that certain molecules from essential oils can interact in the blood with hormones or enzymes, thus helping to reduce pain sensation (Ariyanti M & Y Asbur, 2018). The administration of sandalwood essential oil aromatherapy further aids in reducing labor pain. The healing properties contained in essential oils can penetrate through the skin and enter the body, affecting internal tissues and organs. However, essential oils can be highly dangerous when applied directly to the skin in their pure form (Andarista Siska, 2019).

The results of this study are consistent with the findings of (Desni Sagita et al., 2019), using a pre-experimental method, which stated that there is an influence of sandalwood aromatherapy oil administration on the intensity of labor pain. In primigravida, the pain is felt more intensely at the beginning of labor. Inhalation of sandalwood aromatherapy is capable of reducing the level of labor pain. Labor pain can be alleviated by administering sandalwood aromatherapy, which has a relaxation effect on the respondents and helps to improve the body's system functions.

The results of the study by (Ristiani, 2022) also stated that aromatherapy with sandalwood essential oil as a simple, inexpensive, non-invasive, and effective intervention for reducing labor pain. Inhaling essential oils can improve emotional health, calmness, and relaxation in the body. The content of lavender aromatherapy includes linalool, alcohol, ketones, esters, and aldehydes, which can induce calmness. Several reports suggest aromatherapy to reduce pain, aches, and stress during labor.

CONCLUSION

The intensity of first-stage labor pain before the administration of sandalwood essential oil aromatherapy (*Santalum album L.*) at Elliani Clinic was severe pain for 16 respondents (53.3%) and moderate pain for 14 respondents (46.7%). The intensity of first-stage labor pain after the administration of sandalwood essential oil aromatherapy (*Santalum album L.*) at Elliani Clinic decreased to mild pain for 18 respondents (60.0%), moderate pain for 10 respondents (33.3%), and severe pain for 2 respondents (6.7%).

There is an influence of sandalwood essential oil aromatherapy (*Santalum album L.*) administration on the intensity of first-stage labor pain at Elliani Clinic with a p-value of 0.000 ($p < 0.05$). The analysis results indicate that the administration of sandalwood essential oil aromatherapy is proven effective in reducing the intensity of first-stage labor pain at Elliani Clinic.

This study has significant implications for midwifery and obstetrics practice. The use of essential sandalwood aromatherapy oil has been proven effective in reducing the intensity of pain during the first stage of labor. The implication of these findings is that the administration of sandalwood aromatherapy can be an effective and safe alternative for managing labor pain, with the potential to reduce reliance on pharmacological analgesia. Thus, this discovery can positively contribute to the care practices of pregnant and birthing mothers, enhancing the childbirth experience and the well-being of both mother and newborn. Additionally, the results of this study can serve as a basis for further research in this field, including investigations into the mechanisms of sandalwood aromatherapy and its potential use in pain management during labor in various clinical settings. The limitations of this study are to determine the Influence of Sandalwood

Essential Oil Aromatherapy (*Santalum Album L.*) on the Intensity of Pain Reduction during the First Stage of Labor at Elliani Clinic. It is hoped that this research can provide information to laboring mothers that essential oils can reduce the intensity of pain during childbirth, aiming to decrease the use of pharmacological effects on the health of laboring mothers.

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