Jurnal Kebidanan dan Keperawatan Aisyiyah
Vol. 19, No. 2 (2023), pp. (89-98)
e-ISSN 2477-8184
p-ISSN 1858-0610
10.31101/jkk.3325

The Effectiveness of Lavender Aromatherapy on Anxiety Levels in Maternity Mothers

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Submitted: September 21, 2023 Revised: November 22, 2023 Accepted: December 19, 2023

Abstract
Anxiety in mothers is a clinical problem that can cause maternal depression and affect development. However, there is actually no special treatment that can be given to maternity mothers to reduce the anxiety felt. Giving lavender aromatherapy is one way of reducing maternal anxiety before labor. This study aims to analyze the effect of lavender aromatherapy on the level of anxiety in labor. This quantitative research uses a quasi-experimental design and a pretest-posttest control design. The sampling for the research was carried out by using random sampling techniques. The sample was 60 maternity mothers in the active phase with 30 intervention group respondents and 30 control group respondents, with lavender aromatherapy intervention in one of the hospitals in Kediri. The results showed a difference in anxiety levels in the intervention group and the control group after lavender aromatherapy was given to maternity mothers. Lavender aromatherapy has been proven to affect the hypothalamus and reduce the secretion of corticotrophin-stimulating hormone through olfactory pathway stimulation, which can ultimately lower maternal anxiety levels before labor. The use of lavender aromatherapy in labor rooms in various services, both services at PUSKESMAS (Community Health Centre) and hospitals, should be considered to reduce maternal anxiety before delivery.

Keywords: anxiety; aromatherapy lavender; labor

1. Introduction

During the process of labor, mothers will experience fear and anxiety (Liao et al., 2020). The anxiety is the most common response of maternity women (Ghiasi et al., 2019). Despite current advances in care and decreased maternal morbidity and mortality, mothers still experience fear and anxiety during labor (Mohyadin et al., 2021). Anxiety during pregnancy and labor will increase the intensity of pain and will decrease the mother's ability to cope with pain (Abbasi et al., 2021). Pain and anxiety can affect the process of labor; severe labor pain and anxiety can also increase adrenalin and cortisol, leading to decreased uterine activity and prolonged labor (Shahbazzadegan & Nikjou, 2022). The most common cause of anxiety is the fear of childbirth, which can lead to prolonged labor, thus causing death in the mother and fetus. Proper training can reduce anxiety (Uludağ & Mete, 2021). Anxiety in mothers is a clinical problem that can cause maternal depression and affect fetal development (Domínguez-Solís et al., 2021).

Benzodiazepines are common drugs to treat anxiety in the short term (Manor et al.,2021). Regarding the treatment of anxiety during pregnancy, labor and postpartum, many women are reluctant to take medication for fear of possible side effect for the fetus or newborn (Domínguez-Solís et al., 2021). Though medications taken to reduce anxiety are available, they are not commonly used by mothers before labor.

Non-pharmacological therapy is quite popular to reduce pain during labor. There are many techniques of non-pharmacological to reduce anxiety and increase maternity satisfaction in mothers (Movahedi et al., 2022). The most popular method of non-pharmacological for pregnant and maternity mothers are breathing techniques, position changes, massages, relaxations, music, childbirth support (e.g., doula, couple), hot and cold water-based hydrotherapy, aromatherapy, transcutaneous electrical

nerve stimulation (TENS), sterile water injections, hypnosis and acupuncture (Sharpe & Rollins, 2022). Nevertheless, aromatherapy is the safest method as it does not directly contact the patient's body. Aromatherapy works by activating the sense on the nerve cells in the nasal cavity. It has a powerful effect on the body (Purohit et al., 2021). The molecules in aromatherapy enter the brain's limbic system and simultaneously influence receptors GABA (gamma-aminobutyric acid) in the hypothalamus, which is very important for relaxation (Cui et al., 2022). Benzodiazepine, a group of tranquilizers or sedatives that can be used in anxiety disorder, and increases GABA (gamma-aminobutyric acid) in the amygdala (Jafari-Koulaee et al., 2020). Camphor, terpinen-4-ol, linalool, linalyl acetate, beta-ocimene, and 1, 8-cineole found in lavender plants that can stimulate the parasympathetic system and linalyl acetate has a narcotic effect that acts as a sedative and linalool as sedative (Crișan et al., 2023). Lavender, also called lavendulan angustifolia, is characterized by high levels of linalyl acetate and linalool (Li et al., 2021). Both components are responsible for lavenders' pharmacological effects, including their activity, which is considered soothing and sedative (Donelli et al., 2019). In addition to its low risk of toxicity, lavender aromatherapy oil is known worldwide for its sedative, antidepressant, antiseptic, relaxing, and antiemetic properties (de Melo Alves Silva et al., 2023).

Lavender aromatherapy can be used as an effort to reduce anxiety and pain in mothers during labor, where a significant relationship was found between reduced cortisol and anxiety levels (Kazeminia et al., 2020). The scent of lavender causes a decrease in serum cortisol levels. Linalool in lavender inhibits the release of acetylcholine and changes the function of ionic channels and neuromuscular connection regions, due to which linalyl acetate exhibits narcotic function. At the same time, linalool also serves as a sedative. The use of aromatherapy can reduce anxiety and induce peaceful emotions. Lavender aromatherapy affects the hypothalamus and the reduction of corticotrophin-stimulating hormone secretion through the stimulation of olfactory pathways (Farzan et al., 2023).

The decrease in anxiety is a very important factor in efforts to reduce maternal morbidity, considering that anxiety in maternity mothers can cause prolonged labor. In addition, it must also be continued with relief measures that have the potential for complications. The purpose of this study was to analyze the effect of lavender aromatherapy (Lavendula angustifolia) on the level of anxiety in childbirth at Kediri City Hospital.

2. Research Method

2.1.Research Design

This quantitative study uses a quasi-experimental design that uses a pretest-posttest control group design. Research was conducted by giving lavender aromatherapy to maternity mothers. During the active phase of the intervention, the group will be observed first before being given lavender aromatherapy and again after being given lavender aromatherapy. The population in this study was all maternity mothers at Kediri General Hospital.

2.2. Setting and Samples

This research was conducted from Juni–to July 2023 at two hospitals in Kediri as primary data. The sample of the research was 60 maternity mothers divided into two groups, namely 30 intervention group respondents and 30 control group respondents who were by the inclusion criteria of the research. The research sample technique uses random sampling. The inclusion criteria were the inclusion of primigravida and multigravida mothers who gave birth vaginally, pregnancy age 37–42 weeks, single pregnancy, cervical dilation of a maximum of 4 cm, and were willing to be given lavender aromatherapy. The number of samples in the study was 60 respondents.

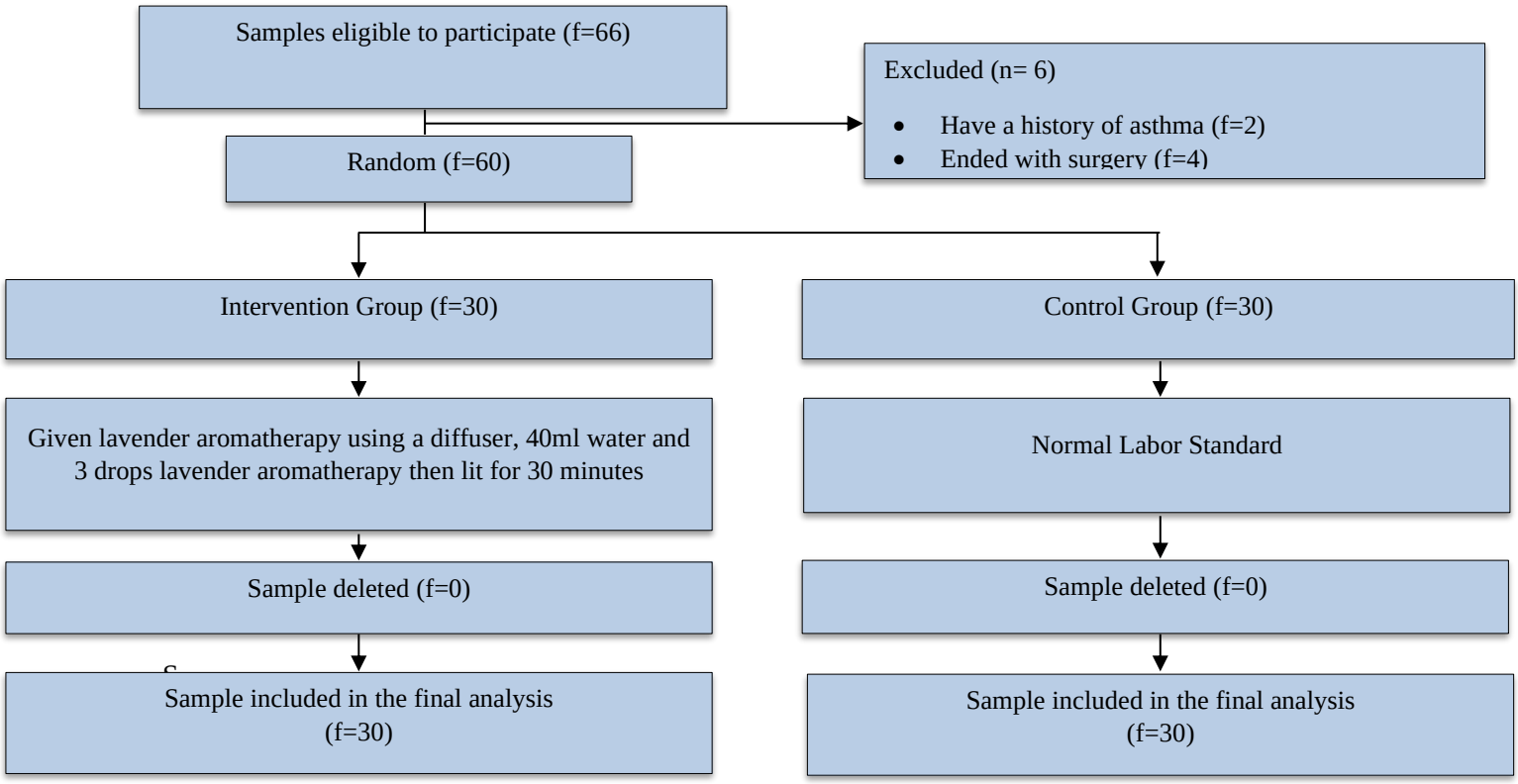

Fig 1. Research Consort
(Barbour et al., 2017)

2.3.Intervention (Applied To Experimental Studies)

Data was collected on maternity mothers in two hospitals, totaling 60 respondents divided into 30 intervention and 30 control group respondents. Then, the researcher explained the objectives, benefits, and procedures for implementing the research and provided informed consent for the respondents' approval. The Intervention Group got three drops of lavender aromatherapy and 40ml of water using a diffuser. The researcher carried out the assessment of the first anxiety level (pretest) in both groups, after which the intervention group was given a 30-minute treatment of lavender aromatherapy. For the next 30 minutes, the researcher assessed anxiety levels in both groups.

2.4.Measurement and Data Collection

Data were measured by using the State-Trait Anxiety Inventory (STAI) questionnaire. The scale of anxiety. This scale of anxiety consists of 20 question items with response options based on four points : ("Not at all: "slightly," "moderate," and "very"). STAI anxiety scores range from a minimum score of 20 to a maximum of 80. A low score indicates no or less anxiety, while a higher score indicates a higher level of anxiety.

2.5.Data Analysis

The Normality Test uses the Shapiro-Wilk test. The test is used to determine whether the data obtained is normally distributed or not. Test homogeneity using the Independence Test. Univariate analysis only describes each variable. The data analyzed were age, occupation, recent education, and parity. Bivariate analysis is used if two variables are to be analyzed. The statistical test in this study

used the Paired Sample T-Test, while the difference test between the two groups used the Independent Sample t-test. Data was then analyzed using SPSS version 26.0.

2.6.Ethical Considerations

Research ethics permits are based on six basic research principles: beneficence and non-malfeasance, fidelity and responsibility, integrity, justice, respect for people's rights and dignity, and ethical clearance. Ethical feasibility is a written statement by the Research Ethics Commission for research involving living things. It states that research is feasible after meeting certain requirements. This research has received ethical approval from the Poltekkes Ethics Commission of the Ministry of Health, Malang, with a recommendation letter No.DP.04.03/F.XXI.31/959/2023 was issued on September 4, 2023, valid until September 4, 2024.

3. Results and Discussions

3.1.Results

After one month of research at DKT Hospital and Ratih Hospital, Kediri, data was obtained and processed through editing, coding, scoring, tabulating, entry, and cleaning. The results were carried out with a normality test with normal results, while with a homogeneity test, the results were homogeneous. The study results are presented in univariate and bivariate analyses using SPSS.

Tabel 1. Distribusi frekuensi karakteristik responden

Characteristic	Group				*P value*
	Intervention (n=30)		Control (n=30)		
	n/M	%/SD	n/M	%/SD	
Age	26.93	4,479	27.27	4,748	0.781 [a]
Education					0.595 [b]
Elementary	8	23.3	15	50	
Intermediate	15	23.3	13	43.3	
Advanced	7	53.3	2	6.7	
Work					0.609 [b]
Work	10	30.3	15	50	
Not Working	20	66.7	15	50	
Paritas					0.615 [b]
Primigravida	18	60	17	56.7	
Multigravida	12	40	13	43.3	
Anxiety Level	47,77	5,654	44.97	5,499	0.078 [b]
Duration of active phase I	65,13	4,049	65.33	4,901	0.062 [b]

Note. [a] = Uji *Anova*, [b]= Uji *Levene*

Based on Table 1, it can be explained that the respondents have general characteristics: age, education, occupation, and parity. There were 60 respondents, with 30 intervention group respondents and 30 control group respondents. The table shows that the average age in the intervention group was 26.93 years, and in the control group, it was 27.27 years. Regarding education, respondents to the intervention and control groups were mostly secondary education, with 28 respondents (46.6%). Based on their work, the intervention and control groups were mostly unemployed, with 35 respondents (58.3%). Seeing the respondent parity of the intervention and control groups, primigravida mostly had three respondents (58.3).

Table 2. Anxiety level before and after lavender aromatherapy in the intervention group

Variable	Intervention Group (n=30)		P value
	Pretest	Posttest	
	Mean ±SD	Mean ± SD	
Level of Anxiety	47.77 ±6,339	32.97 ±0.5.654	0.000

Note. Paired t-test

Table 2 above explains that the level of anxiety in the intervention group showed that the average pretest was 47.77, which means a moderate level of anxiety, and the average posttest was 32.97, which means a mild level of anxiety. The data showed clearly a decrease in anxiety level by 14.8. The average results of the pre-test and post-test showed decreased anxiety in the intervention group. At the same time, the results of the paired t-test on the anxiety level of the intervention group showed significant results with a p-value of 0.000, which confirms that the level of anxiety decreased after lavender aromatherapy was given to the intervention group of maternity mothers.

Table 3. Frequency of anxiety level before and after lavender aromatherapy in the intervention group

Level of Anxiety	Intervention Group (n=30) Frequency of Anxiety Level		P Value
	Pretest	Posttest	
Mild Anxiety	0	27	0,000
Moderate Anxiety	27	3	
Severe Anxiety	3	0	
Total	30	30	

Note. Wilcoxon Test

Table 3 describes the frequency distribution of anxiety levels before and after lavender aromatherapy in the maternity intervention group. It is known that the pretest level of moderate anxiety was 27 (90%), and very few respondents experienced severe anxiety, as many as three respondents (10%). In the posttest, the level of mild anxiety was 27 (90%), and those who experienced moderate anxiety were three respondents (10%).

Table 4. Anxiety Levels before and after standard care in the control group

Variable	Control Group (n=30)		P value
	Pretest	Posttest	
	Mean ±SD	Mean ± SD	
Level of Anxiety	44.97 ±5,499	46.40 ±11,734	0.522

Note. Paired t-test Test

Based on Table 4, the results of the analysis of anxiety levels in the control group exposed an average pretest data of 44.97, which means it has a moderate level of anxiety, and the average posttest anxiety level in the control group is 46.40, which means a moderate level of anxiety. Results in the posttest control group explained an increase in anxiety of 1.43. The average pre-test and post-test confirmed an increase in anxiety in the control group. The results of the Paired t-test on the level of anxiety from the control group exposed an insignificant result of a p-value of 0.522, which means that the level of anxiety increased after receiving standard care in the control group maternity mothers.

Table 5. Frequency of anxiety levels before and after standard care in the control group

Level of Anxiety	Control Group (n=30) Frequency of Anxiety Level		P Value
	Pretest	Posttest	
Mild Anxiety	4	6	
Moderate Anxiety	26	14	0.537
Severe Anxiety	0	10	
Total	30	30	

Note = Wilcoxon Test

Table 5 above shows the frequency distribution of anxiety levels before and after standard care in the control group of maternity mothers. The data showed that the pretest level of mild anxiety was four respondents, moderate anxiety was 26 respondents, and no one experienced severe anxiety. In the posttest, a mild anxiety level of six respondents (20%), moderate anxiety level of 14 respondents (46.7), and severe anxiety of as many as ten respondents (33.3%).

Table 6. Differences in anxiety levels in both groups

Variable	Group		P value
	Intervention Mean ±SD	Control Mean ± SD	
Level of Anxiety	32.97 ±5,654	46.40 ±11,734	0.000

Note. Independent sample t-test

To determine the difference in anxiety levels between the two groups after giving lavender aromatherapy to the intervention group, a different test was done by using the independent sample t-test. The results of the data analysis shown in Table 6 revealed that the average posttest anxiety level in the intervention group was 32.97 (mild anxiety), and the average posttest anxiety level in the control group was 46.40 (moderate), where there was a posttest difference in the intervention and control groups of 13.43. The results of the independent sample t-test on the anxiety level of both groups confirmed a significant result of a p-value of 0.000, which means that there was a difference in anxiety levels in both groups after having lavender aromatherapy intervention in the maternity intervention group.

3.2. Discussions

The mean age of the intervention group was 26.93 years, and the control group was 27.27 years. Pregnant women under the age of less than 25 years have a risk of prenatal depression (Lockwood Estrin et al.,2019). Younger women significantly have a higher fear of childbirth score, as younger women have less experience (Anderson et al.,2019). Older women (>35 years) feel a higher risk of pregnancy for themselves, so they worry more about their babies (Brunton et al.,2020). The characteristics of respondents based on their education: most of the intervention and control groups were secondary education. There is a significant relationship between anxiety scores and education level (Effati-Daryani et al.,2020). The level of education a person has determines his knowledge of a particular issue. The higher the level of knowledge, the lower the level of anxiety (Suyani,2020).

Characteristics of respondents based on their occupation in the intervention group and control group, most of whom did not work or were housewives. Previous research examined the relationship between anxiety and housewives and found the results that there are unemployed housewives where stress, depression, and low social support were associated with the development of anxiety symptoms (Tang et al., 2019). The characteristics of respondents based on parity in both groups were primigravida

(first pregnancy). Previous studies found that mothers with primiparous children had higher anxiety scores since early pregnancy compared to multiparous mothers (Nakamura et al., 2020). First-time mothers have a greater fear of labor pain and other problems that may occur during labor (Brunton et al., 2020).

The difference in anxiety levels decreased, whereas in the intervention group posttest, there was an increase in anxiety by 14.8 (mean pretest 47.77 and posttest 32.97). It can be concluded that the level of anxiety decreased after lavender aromatherapy intervention (Lavendula angustifolia) in maternity mothers. Psychological factors, including fear and anxiety that will cause pain during labor, will be different (Akköz Çevik & Karaduman, 2020). Mothers who experience anxiety may increase the risk of preterm birth (Domínguez-Solís et al., 2021). Lavender aromatherapy is used as an anxiety reducer due to the content of camphor, terpinene-4-ol, linalool, linalyl acetate, beta-ocimene, and 1,8-cineole in lavender, which can stimulate the parasympathetic system and cause a relaxing effect (Salsabilla, 2020). Maternity mothers who inhale lavender aroma oil are proven to reduce anxiety during labor. It found a significant association between reduced cortisol levels and anxiety levels. Pregnant women with lavender aromatherapy have been shown to experience a decrease in serum cortisol levels. In addition to lowering serum cortisol levels, the linalool content in lavender also causes inhibition of acetylcholine release and changes in the function of ionic channels and neuromuscular connection regions. Linalyl acetate is a compound that has a narcotic function, and linalool also functions as a sedative (Kazeminia et al., 2020). Based on the study, the average increase in anxiety levels in the control group was obtained from an average of 44.97 (moderate anxiety) to 46.40 (moderate anxiety). This is because, before delivery, the average mother experiences increased anxiety due to fear and previous labor experiences. The results of the study concluded that, by looking at the average and results of the analysis, the level of anxiety in the control group increased after being given standard care compared to before being given standard care. The average anxiety level in the intervention group was mild anxiety, while the average anxiety level in the control group was severe anxiety.

Although many research results have shown a significant relationship between giving aromatherapy can reduce anxiety and anxiety scores (Ebrahimi et al., 2022), other risk factors also influence the occurrence of anxiety in maternity mothers. Age is one of the factors that influences pain. Maternity age that is too young can trigger severe pain because young age tends to be associated with psychological conditions that are still labile, so it triggers anxiety (Sari et al., 2022). Mothers with primigravida often complain of physiological symptoms such as nausea, vomiting, and back pain; this can trigger anxiety, and anxiety tends to decrease in multigravida women (Rahayu & Ariningtyas, 2023). Fear, anxiety, and fatigue when facing labor will affect the mother. Therefore, if maternity mothers want to avoid excessive pain, then there should be no need to feel afraid and anxious when facing labor (Ria et al., 2020). In addition to age, the perception of pain is also one of the factors that triggers the emergence of anxiety. Pain is an unpleasant feeling or emotion about an actual or potential danger. According to Gate Control theory, there is a link between pain and emotional or psychological problems such as anxiety. Women with lower levels of anxiety experience less pain during labor. Severe pelvic floor and perineal muscle contractions due to anxiety affect labor pain (Abbasijahromi et al., 2020). Aromatherapy is defined as a plant that involves transmitting signals from the olfactory system to the brain, which regulates anxiety, depression, and mood disorders (Grabnar et al., 2021). There are two main terpenoid constituents in lavender oil, namely linalool and linalyl acetate, which can produce anxiolytic, anti-anxiety, and anti-stress effects (Zhang & Yao, 2019; Malcolm & Tallian, 2017). Linalool functions as a sedative, and linalyl acetate has a sedative effect (Usta et al., 2021).

4. Conclusion

Anxiety levels decreased after lavender aromatherapy in the intervention group in maternity, with significant results (p-value = 0.000). Anxiety levels increased after being given standard care in a control group of maternity mothers. The difference in anxiety levels in the two groups after lavender aromatherapy in maternity showed (p-value = 0.000). It is hoped that lavender aromatherapy intervention can be an alternative for midwives in pro viding obstetric care for childbirth with non-pharmacological methods to reduce anxiety levels in maternity mothers. Further research will be able to conduct research on anxiety in maternity mothers experiencing puerperium.

Acknowledgment

We want to express our deepest gratitude to all parties involved in and participating in this research so that it can be carried out smoothly and completed on time. We hope this research can contribute positively to the development of science and provide positive benefits for midwives and maternity mothers.

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