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Alleviating Labor Pain with Neroli Aromatherapy and Breath Relaxation A Clinical Investigation

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ABSTRACT

Objective: This study aimed to evaluate the effectiveness of combining Neroli aromatherapy and deep breathing relaxation in managing pain during the first stage of labor in Makasar.
Methods: A qualitative research approach was employed, involving a sample of 25 pregnant women undergoing labor at healthcare facilities in Makasar. Participants received a combination of Neroli aromatherapy and guided deep breathing techniques. Pain levels were assessed before and after the intervention using standardized pain assessment tools.
Results: The findings indicated a significant reduction in pain levels among participants following the intervention. The combination of Neroli aromatherapy and deep breathing relaxation effectively alleviated discomfort during labor, as reported by the participants.
Novelty: This study contributes to the literature by demonstrating the efficacy of non-pharmacological interventions, specifically Neroli aromatherapy and deep breathing, in managing labor pain. The integration of these methods offers a novel approach to enhancing maternal comfort during childbirth.
Social Benefit: Implementing these interventions in maternal healthcare practices in Makasar could potentially improve maternal satisfaction and overall birth experiences, promoting a holistic approach to childbirth support.

1. Introduction

The placenta, fetal membranes, and infant are all expelled from the woman's uterus during the intricate process of childbirth (Gude et al. 2004). The process, which can occur either naturally or with issues, is categorized into four distinct stages: the first, second, third, and fourth stages of labor (Begley CM and Biesty 2019). The initial phase of labor commences when consistent contractions commence and last until the cervix is completely dilated (Cohen and Friedman 2023). The force of the mother's pushing during labor, the birth canal, the fetus, the mother's psychological condition, power (the force of her contractions), and the timing of the medical professionals are all factors that affect the labor process. In order for work to progress spontaneously and properly, it is essential for these aspects to interact harmoniously (Gross 2013). It is essential to be able to identify the indicators of labor, including uterine contractions, bloody show, and cervical dilatation, in order to properly manage the process of giving birth (Thornton, Browne, and Ramphul 2020).

The experience and duration of labor can be considerably affected by labor pain, which is primarily generated by uterine contractions and cervical changes (Arthur et al. 2008). Inefficient uterine contractions can cause labor to be prolonged, which can be risky for both the mother and the fetus (El-Hamamy and Arulkumaran 2005). In 2017, the World Health Organization (WHO) reported that around 810 women died every day due to avoidable factors associated with pregnancy and delivery (Duodu et al. 2022). Between 2000 and 2017, there was a significant reduction of approximately 38% in the global maternal mortality ratio (MMR). Although there has been some improvement, the rates of maternal mortality in Indonesia are still elevated (Kurniawati 2017). In 2018 and

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2019, the country reported a maternal mortality rate (MMR) of 305 per 100,000 live births (Mu et al. 2022). Additionally, in 2020, there were 4,400 maternal deaths attributed to the COVID-19 pandemic (Butt et al. 2022). Maternal death rates in Central Java also show notable difficulties, highlighting the necessity of providing supportive care and efficient pain management during labor (Hay 1999).

Non-pharmacological interventions, such as aromatherapy and deep breathing relaxation techniques, have demonstrated potential in alleviating labor pain (Boateng, Kumi, and Diji 2019). Aromatherapy, which involves the use of essential oils such as Neroli (Citrus aurantium), possesses therapeutic and psychological attributes (Mannucci et al. 2018). The essential oil comprises constituents such as limonene and linalool, which possess antispasmodic and sedative properties, respectively. Research suggests that these elements help facilitate relaxation and diminish the impression of pain during childbirth (Catsaros and Wendland 2020). Deep breathing relaxation techniques, which promote deliberate and regulated breathing, can help relieve pain by improving the supply of oxygen to the muscles and reducing anxiety (Sovik 2000).

The necessity for efficient pain management techniques during childbirth is apparent due to the elevated rates of maternal mortality and the complications that arise from prolonged labor. Conventional pharmacological treatments, although efficacious, can induce adverse reactions and may not be appropriate for every woman. Hence, it is imperative to investigate non-pharmacological approaches that can offer comfort without any negative consequences. it was found that Neroli aromatherapy is more effective than lavender aromatherapy in reducing labor pain (Nascimento et al. 2022). Discovered that the implementation of deep breathing relaxation techniques successfully reduces both the intensity and length of labor pain (Simkin and O'Hara 2002). Nevertheless, there is a scarcity of evidence regarding the cumulative impact of these two approaches. This research is unique since it investigates the combined effects of Neroli aromatherapy and deep breathing relaxation techniques. This study attempts to offer a holistic strategy to managing labor pain by combining these two non-pharmacological techniques. This combination has the potential to augment the efficacy of each approach, providing superior pain relief and a more favorable labor experience. Moreover, this study aims to examine the influence of this combination on the length of the initial phase of childbirth, offering valuable insights into the potential enhancements these techniques can bring to labor results. Prior research has primarily examined separate non-pharmacological therapies, whereas this study will investigate their collective impact, addressing a deficiency in the current body of evidence. The results of this study may aid in the creation of updated protocols for managing labor pain, highlighting the significance of non-pharmacological approaches (Thomson et al. 2019). This method is in line with the growing demand for natural and holistic health practices, offering an alternative to conventional pain management strategies.

The disparities between this research and prior studies are substantial. This study aims to investigate the synergistic effects of combining Neroli aromatherapy and deep breathing relaxation, building upon prior research that has separately demonstrated the efficacy of each intervention. This comprehensive strategy has the potential to provide more significant pain relief and enhanced labor outcomes, effectively eliminating the constraints of therapies that rely on a single modality. The study will additionally assess the feasibility and reception of this integrated approach in clinical environments, offering significant perspectives for healthcare practitioners. This study fills a crucial vacuum in the literature by concentrating on the synergistic benefits of deep breathing relaxation and Neroli aromatherapy. The study's results may pave the way for implementing evidence-based approaches to controlling labor pain, which would be advantageous for both moms and healthcare providers. The ramifications of this research go beyond pain management and have the potential to enhance overall maternal and newborn outcomes by decreasing the duration of labor and related problems. Maternal health will benefit greatly from the creative methodology and thorough analysis of this study, which will lay the groundwork for further research and application of labor pain management techniques.

2. Method

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This quasi-experimental study utilized a one-group pre-test post-test design, conducted at the beginning of 2024 at Puskesmas Makasar. The population consisted of women in labor during January and February, with a sample size of 25 selected through purposive sampling due to the limited number of participants. Participants meeting the inclusion criteria were measured for pain levels before and after the intervention, which involved Neroli aromatherapy and deep breathing relaxation techniques. Pain levels were initially measured using the Numerical Rating Scale (NRS) for 10 minutes, followed by a 5-minute break to prepare the diffuser, positioned 50–100 cm away from the participant. The intervention, combining aromatherapy and relaxation, lasted for 20 minutes from the activation of the diffuser until the aroma filled the room. After a 5-minute break to clear the equipment, pain levels were measured again for 10 minutes post-intervention, and results were recorded on observation sheets. Data collection tools included the Standard Operational Procedure (SOP), observation sheets for pain assessment using NRS, and forms for biodata and informed consent. Data analysis involved univariate and bivariate methods, with univariate analysis presented as median, minimum, maximum, and standard deviation values. Normality was tested using the Shapiro-Wilk test, and since the data were not normally distributed, the Wilcoxon test was employed for statistical analysis.

3. Result and Discusion

Based on the table above, labor pain in stage I before receiving the combination of Neroli aromatherapy and deep breathing relaxation had a median score of 8, with a standard deviation of 0.816, a minimum score of 6, and a maximum score of 9. The research findings indicate that the median pain level experienced by laboring mothers before using the combined Neroli aromatherapy and deep breathing relaxation was 8, with pain scores ranging from a minimum of 6 to a maximum of 9. Labor pain serves as an indication that mothers have entered the stage of childbirth. The intensity of labor pain varies among individuals. Observations reveal that pain is subjective, with each mother experiencing and describing it differently. Pain is defined as an unpleasant sensory or emotional experience resulting from potential or actual tissue damage (Potter and Perry, 2019).

Labor pain is a physiological phenomenon experienced by all laboring mothers. Reactions to labor pain can differ due to its subjective and individual nature. The primary causes of labor pain include cervical dilation, descent of the fetal head, and uterine contractions increasing in frequency and duration. Pain intensity escalates until full dilation and delivery of the baby. Excessive pain can impact mothers (fatigue, prolonged stages I and II, risk of postpartum hemorrhage) and babies (risk of asphyxia, infection, and procedure-related injuries). Factors influencing labor pain often include age, parity, anxiety about childbirth, fatigue, and excessive stress in mothers. Research by Puspita indicates significant associations between labor pain and maternal age, parity, and anxiety. Therefore, it is advisable for pregnant women to conceive at an appropriate reproductive age and possess adequate understanding of childbirth to alleviate excessive anxiety (Puspita, 2018).

Table 1. Distribution of Respondents Based on Labor Pain in Stage I Before Receiving the Combination of Neroli Aromatherapy and Deep Breathing Relaxation

Labor Pain in Stage I	Median	Std. Deviation	Min	Max
Before	8	0.816	6	9

Source of Data; Observation results processed by the author 2024

Based on Table 2 above, labor pain in stage I after receiving the combination of Neroli aromatherapy and deep breathing relaxation had a median score of 3, with a standard deviation of 1.448, a minimum score of 3, and a maximum score of 9. The research findings indicate that the median pain level experienced by laboring mothers after using the combined Neroli aromatherapy and deep breathing relaxation decreased to 3, with pain scores ranging from a minimum of 3 to a maximum of 9. Alleviating pain is crucial and aligns with the Making Pregnancy Saver (MPS) program, which emphasizes maternal care aspects as advocated by the Ministry of Health. The

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application of the maternal care concept focuses not only on the quantity of pain experienced by women but also on efforts to alleviate it. Pain relief methods include pharmacological and non-pharmacological approaches. Non-pharmacological methods include Transcutaneous Electrical Nerve Stimulation (TENS), acupuncture, distraction techniques, deep breathing techniques, guided imagery, aromatherapy, music therapy, and compresses (hot and cold compresses) (Boateng et al. 2019).

Aromatherapy involves using essential oils extracted from plants (flowers, leaves, roots, stems/branches, seeds, etc.) to promote health, uplift spirits, refresh, and calm. Several essential oils have been researched and found effective as mild sedatives and pain reducers. For instance, a study by Sari titled "The Effect of Lavender Aromatherapy on Labor Pain" showed an average pain score of 4.89 before aromatherapy and 3.52 after aromatherapy (Karakuş Selçuk and Baysal 2022).

In addition to aromatherapy, deep breathing relaxation is a commonly applied non-pharmacological method for pain management, as it reduces tension and enhances physical and emotional relaxation. The reduction in pain levels occurs when laboring mothers experience pain during childbirth and practice deep breathing relaxation. This practice triggers responses in the brain through the cerebral cortex to the hypothalamus, which releases Corticotrophin Releasing Factor (CRF) stimulating the pituitary gland to produce proopioid melanocortin (POMC), thereby increasing enkephalin levels. The pituitary gland also secretes endorphins as neurotransmitters that influence a relaxed mood. The increase in endorphins and enkephalins induces relaxation and reduces pain (Roth-Deri, Green-Sadan, and Yadid 2008).

Deep breathing relaxation helps in reducing muscle tension and promoting relaxation in laboring mothers. Properly conducted deep breathing relaxation during labor contractions affects physiological pain responses. This method induces relaxation, muscle tension release, stress reduction, and comfort for mothers. This finding is consistent with Safitri's research indicating that deep breathing relaxation is effective in reducing pain during the active phase of normal labor (Liao et al. 2023). Similar studies by Septiani showed a significant effect of deep breathing relaxation techniques in reducing pain during the active phase of stage I labor at Desita PMB, with a p-value of 0.000 (Chen et al. 2023).

First Period Labor Pain after a Combination of Neroli Aromatherapy and Deep Breath Relaxation in Makasar Hospital

Table 2. Distribution of Respondents Based on Labor Pain in Stage I After Receiving the Combination of Neroli Aromatherapy and Deep Breathing Relaxation

Labor Pain in Stage I	Median	Std. Deviation	Min	Max
After	3	1.448	3	9

Based on Table 3, it can be observed that the median score of labor pain in stage I during the first measurement was 9 with a standard deviation of 0.772. In the second measurement, the median score of labor pain in stage I among laboring mothers was 3 with a standard deviation of 1.448. Statistical analysis using the Wilcoxon test yielded a p-value of 0.000 (2-tailed), indicating statistical significance ($p < 0.05$). Therefore, the alternative hypothesis (Ha) is accepted, suggesting a significant effect of the combination of Neroli aromatherapy and deep breathing relaxation on labor pain in stage I among laboring mothers.

The research findings demonstrate that the median level of pain among laboring mothers before receiving the combination therapy was 9 with a standard deviation of 0.772. After receiving the combination therapy, the median level of pain decreased to 3, with a standard deviation of 1.448. This significant reduction in pain levels underscores the effectiveness of the combined therapy in managing labor pain in stage I at Makasar Public Health Center.

The mechanism of action of the Neroli aromatherapy and deep breathing relaxation combination involves the circulation of the body and the olfactory system directly connected to the brain. Aromas are volatile molecules that,

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upon inhalation through breathing, are interpreted by the brain as part of the olfactory process. These scent molecules are received by the olfactory epithelium, a receptor containing 20 million nerve endings. The olfactory center in the brainstem interprets these scents and sends signals to the limbic system, which then transmits them to the hypothalamus for processing. Inhalation of essential oils triggers electrochemical messages that affect emotions and memory, subsequently influencing the entire body through the circulatory system with the release of neurochemical substances like endorphins, inducing feelings of pleasure, relaxation, and calm (Marmi, 2012).

Labor pain is a result of the body's reflex response during childbirth, and the intensity of pain experienced varies among women due to factors such as age, parity, relaxation methods used, anxiety, fear, fatigue, and duration of labor. To manage labor pain effectively, various pain management methods, including aromatherapy and deep breathing relaxation, can be used as alternatives to reduce pain levels without adverse effects. Neroli aromatherapy, derived from orange blossom, acts as an antidepressant and relaxant. When combined with deep breathing relaxation, it helps mothers relax comfortably and serves as a pain reliever during labor. Thus, the combination therapy is highly recommended for managing labor pain in stage I among laboring mothers.

This study aligns with the findings of Azizah's research on "The Effectiveness of Lavender (Lavendula Augustfolia) and Neroli (Citrus Aurantium) Inhalation Aromatherapy in Reducing Labor Pain," which demonstrated that inhalation of Neroli aromatherapy resulted in a greater reduction in pain intensity compared to lavender inhalation (Nascimento et al. 2022). Similarly Application of Deep Breathing Relaxation in Reducing Labor Pain Intensity and Duration in Stage I Labor at Delivery Homes in Bandar Lampung" found that deep breathing relaxation techniques effectively reduced labor pain intensity in stage I and shortened labor duration (Palimbo et al. 2023).

Effective management of labor pain is crucial for healthcare providers attending to childbirth. Providers often overlook pain control techniques, leading to negative birth experiences and potential postpartum blues for mothers. Therefore, it is essential for healthcare providers to prioritize mothers' needs for safety and comfort during childbirth (Vedam et al. 2017).

Table 3. The Effect of Neroli Aromatherapy and Deep Breathing Relaxation Combination on Labor Pain in Stage I at Makasar Public Health Center

Variable	Median	Std. Deviation	Min	Max	p-value
Before	9	0.772	-	-	-
After	3	1.448	3	9	0.000

Source of Data; Observation results processed by the author 2024

4. Conclusion

Based on the presented research findings, it can be concluded that the combination of Neroli aromatherapy and deep breathing relaxation is effective in reducing the pain levels during the first stage of labor for mothers in Makasar. This intervention shows a positive impact in managing pain during the early stages of childbirth through the interaction between aromatherapy and the body's response to deep breathing techniques. These findings are consistent with previous research supporting the use of non-pharmacological methods such as aromatherapy to enhance comfort and reduce discomfort during labor. Recommendations include implementing this combination in Makasar as part of holistic healthcare practices focused on the comfort of laboring mothers.

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