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The Effects of Counterpressure and Effleurage Techniques on Pain and Anxiety Among Women in The Active Phase of The First Stage of Labor

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Abstract

ABSTRACT

Background: Labor pain and anxiety commonly occur during the active phase of the first stage of labor and may negatively affect maternal comfort and labor progress. This study **aimed** to compare the effectiveness of counterpressure and effleurage techniques in reducing pain and anxiety among women in labor.
Methods: A quasi-experimental comparative design was applied involving 36 women in the active phase of the first stage of labor at Hermina Banyumanik Hospital, Semarang. Participants were divided into counterpressure and effleurage intervention groups. Pain intensity was measured using the Numerical Rating Scale (NRS), and anxiety was assessed using the Visual Analog Scale for Anxiety (VAS-A). Data were analyzed using paired and independent t-tests.
Results: Both counterpressure and effleurage significantly reduced pain and anxiety levels ($p < 0.05$). Effleurage showed a greater reduction in pain compared to counterpressure, while no significant difference was found between the two techniques in reducing anxiety.
Conclusion: Counterpressure and effleurage are effective non-pharmacological interventions for reducing pain and anxiety during labor. Effleurage may be more effective for pain reduction.

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INTRODUCTION

Background of the study

Labor pain is a physiological process experienced by women during childbirth, particularly during the active phase of the first stage of labor, which is characterized by progressive cervical dilatation and increasingly intense uterine contraction (Lowdermilk et al., 2020). Although labor pain is a natural phenomenon, excessive pain and unmanaged anxiety can trigger a maternal stress response that leads to increased secretion of catecholamines, resulting in reduced uterine blood flow, ineffective uterine contractions, prolonged labor, and an increased risk of maternal and fetal complications (Bobak et al.,2012; Simkin & Bolding, 2004). Anxiety during labor has also been associated with negative childbirth experiences increased perception of pain and decreased maternal satisfaction with the birthing prosess (Adam et al., 2012; World Health Organization, 2018).

Literature review

Previous studies have demonstrated that labor pain and anxiety significantly influence maternal comfort, labor progression, and overall childbirth outcomes. Pharmacological pain management, although effective, may be associated with side effects such as maternal hypotension, reduced mobility, and potential fetal distress. Consequently, non-pharmacological interventions

have gained increased attention as safe and supportive alternatives during labor (Lowdermilk et al., 2020; World Health Organizatio (2018).

Among non-pharmacological approaches, counterpressure and effleurage techniques have been widely applied in intrapartum care. Counterpressure involves continuous firm pressure applied to the lower back, which may alleviate pain by counteracting sacral nerve stimulation. Effleurage, a light rhythmic massage technique, is believed to promote relaxation, stimulate endorphin release, and reduce anxiety through tactile stimulation (Simkin & Bolding, 2004). Several studies have reported that both techniques effectively reduce labor pain intensity and maternal anxiety; however, findings regarding their comparative effectiveness remain inconsistent (Adams et al., 2012; Mander, 2011).

Gap analysis:

Although numerous studies have examined the effectiveness of non-pharmacological pain management techniques during labour, limited research has directly compared the effects of counterpressure and effleurage on both pain and anxiety levels during the active phase of the first stage of labor (Simkin & Bolding, 2004; Mander, 2011). Moreover, existing studies often focus primarily on pain reduction, with less attention given to maternal anxiety as an important psychological outcome that may significantly influence labor progress and maternal satisfaction (Adams et al., 2012; Lowe, 2002). Additionally, evidence from Indonesian clinical settings remains scarce, highlighting the need for context-specific research to support evidence-based intrapartum nursing practice and to strengthen the implementation of non-pharmacological interventions in culturally diverse maternity care environments (World Health Organization 2018; Lowdermilk et al., 2020).

Rationale of the study:

Given the importance of providing safe, effective, and low-cost pain management strategies during labor, it is essential to identify non-pharmacological interventions that can be easily implemented by nurses and midwives in clinical practice. Non-pharmacological pain and anxiety management techniques not only reduce reliance on medical analgesia but also promote maternal autonomy and satisfaction with the childbirth experience (King et al., 2021; Matin et al., 2022). Comparing counterpressure and effleurage techniques may provide valuable insights into their relative effectiveness in reducing both pain and anxiety during labor, as tactile and massage-based interventions have been associated with improved physiological and psychological outcomes in recent systematic reviews (Smith et al., 2023; Zhang & Liu, 2024). Furthermore, evidence suggests that empowering birth attendants with structured non-pharmacological approaches enhances quality of intrapartum care and supports positive maternal–neonatal outcomes without additional costs or adverse effects (World Health Organization 2018; Lee et al., 2023). The findings of this study are expected to contribute to evidence-based maternity nursing care and support the integration of effective non-pharmacological interventions into routine intrapartum services.

Purpose of the study:

The aim of this study was to examine and compare the effects of counterpressure and effleurage techniques on pain intensity and anxiety levels in women during the active phase of the first stage of labor.

Hypotheses

1. Counterpressure and effleurage techniques significantly decrease pain intensity in women during the active phase of the first stage of labor.
2. Counterpressure and effleurage techniques significantly lower anxiety levels in women during the active phase of the first stage of labor.
3. There is a significant difference in the reduction of pain between women who receive counterpressure and those who receive effleurage techniques.

4. There is a significant difference in the reduction of anxiety between women who receive counterpressure and those who receive effleurage techniques.

METHOD

Research Design; This research used a quasi-experimental comparative design to assess the effects of two non-pharmacological interventions on pain and anxiety during labor.

Population: The study population consisted of postpartum women, with 36 participants who were in the active phase of the first stage of labor and met the inclusion criteria. Participants were selected through purposive sampling and divided into two intervention groups: 18 women in the counterpressure group and 18 women in the effleurage group.

Instruments : Pain intensity was measured using the Numerical Rating Scale (NRS), while anxiety levels were evaluated using the Visual Analog Scale for Anxiety (VAS-A). Both instruments are commonly used and have been validated in clinical research.

Procedures and Time Frame : Each intervention was provided during the active phase of the first stage of labor following established standard operating procedures. Data were collected before and after the intervention.

Data Analysis : Statistical analysis was performed using paired t-tests to examine differences within each group and independent t-tests to compare outcomes between the two intervention groups. A significance level of $p < 0.05$ was used for all analyses.

Scope and Limitations : This study was limited by a relatively small sample size and the use of non-random sampling, which may reduce the generalizability of the results. In addition, the research was conducted in a single clinical setting, and potential confounding factors such as individual pain tolerance and emotional support during labor were not fully controlled.

RESULTS AND DISCUSSION

Table 1. Frequency Distribution of Respondents Based on Education, Parity, and Cervical Opening (n=36)

Variable	Frequency	Percentage (%)
Education		
SMA (High School)	14	38.9 %
S1 (Bachelor's Degree)	22	61.1 %
Parity		
Primipara	14	38.9 %
Multipara	22	61.2 %
Cervical Dilation		
Dilation 4	15	41.7 %
Dilation 5	14	38.9 %
Dilation 6	7	19.4 %

The discussion of respondent characteristics aims to interpret univariate research results including age, education, parity, and cervical dilation among mothers in the active phase of the first stage of labor at Hermina Banyumanik Hospital, Semarang. Respondent characteristics are important factors as they can influence pain perception and anxiety during labor. Based on the research findings, respondents' ages ranged from 20 to 36 years with a mean of 28.58 years, which falls within the healthy reproductive age category where physical and psychological conditions are relatively stable, allowing better adaptation to labor pain and stress. Regarding education, the majority of respondents had bachelor's degrees, which enables better understanding of the labor process, relaxation techniques, and pain management information, as higher education influences how mothers perceive and cope with pain and anxiety during labor (Rahmawati, 2019). In terms of parity,

most respondents were multiparous women who generally have previous childbirth experience, making them more mentally and physically prepared to face labor pain, with studies showing that multiparous mothers tend to report lower pain levels compared to primiparous mothers due to better coping strategies (Handayani et al., 2020). All respondents were in cervical dilation of 4–6 cm, indicating the active phase of the first stage of labor, where uterine contractions become stronger and more regular accompanied by progressive cervical dilation, resulting in increased labor pain intensity (Cunningham et al., 2018; Lowdermilk et al., 2020). These characteristics collectively demonstrate that the study population represents mothers in optimal reproductive age with varying educational backgrounds and predominantly multiparous status during the critical active labor phase when pain management interventions are most needed.

Table 2. Analysis of the Effect of Effleurage Technique on Labor Pain (n=18)

	Pain Before and After Effleurage Technique	Mean	S. D	P.Value
1	Pre-effleurage technique pain	7.67	.686	< 0,01
2.	Post-effleurage technique pain	2.78	.428	

Table 2 demonstrates the significant effectiveness of the effleurage technique in reducing labor pain among mothers in the active phase of the first stage of labor. The results showed that the mean pain score before the effleurage intervention was 7.67 (SD = 0.686), which falls into the severe pain category, while after the intervention, the mean pain score decreased substantially to 2.78 (SD = 0.428), indicating mild pain. Statistical analysis revealed a p-value of < 0.01, demonstrating a highly significant effect of the effleurage technique on labor pain reduction. This finding indicates that effleurage, a light stroking massage technique applied rhythmically on the abdomen, back, or thighs, effectively activates the gate control mechanism by stimulating large-diameter nerve fibers that inhibit pain signal transmission to the central nervous system, thereby reducing pain perception (Melzack & Wall, 1965). The significant pain reduction observed in this study is consistent with previous research by Jones et al. (2012), which found that massage therapy during labor significantly decreased pain intensity and improved maternal comfort. Similarly, Smith et al. (2018) reported that effleurage massage during the active phase of labor resulted in lower pain scores and reduced the need for pharmacological pain relief interventions. Furthermore, research by Aprilia et al. (2020) in Indonesia demonstrated that effleurage techniques applied during labor significantly reduced pain perception and enhanced maternal satisfaction with the birthing experience. These findings support the implementation of effleurage as an evidence-based, non-pharmacological intervention for managing labor pain, offering a safe, cost-effective, and empowering approach that can be easily taught to birth companions and integrated into routine maternity care practices.

Table 3. Analysis of the Effect of Counterpressure Technique on Labor Pain (n=18)

	Pain Pre and Post Counterpressure Technique	Mean	S.D	P-Value
1	Pre-counterpressure technique pain	5.78	1.396	< 0.01
2.	Post-counterpressure technique pain	3.44	1.381	

Table 3. illustrates the significant effectiveness of the counterpressure technique in reducing labor pain among mothers during the active hase of the first stage of labor. The findings revealed that

the mean pain score before the counterpressure intervention was 5.78 (SD = 1.396), categorized as moderate pain, which decreased to 3.44 (SD = 1.381) after the intervention, indicating mild pain. The statistical analysis showed a p-value of < 0.01, demonstrating a highly significant effect of the counterpressure technique on labor pain reduction. Counterpressure involves applying firm, steady pressure to the sacral area during contractions, which is particularly effective in alleviating lower back pain commonly experienced during labor due to the pressure of the fetal occiput against the maternal sacrum (Simkin & Ancheta, 2017). This technique operates through the gate control theory mechanism by providing competing sensory input that blocks pain signal transmission to the brain, while also potentially reducing muscle tension and promoting relaxation (Melzack & Wall, 1965). The significant pain reduction observed in this study aligns with findings by Derry et al. (2012), who reported that manual techniques including counterpressure effectively reduced labor pain intensity and improved maternal coping during childbirth. Similarly, research by Mortazavi et al. (2012) demonstrated that sacral pressure application during labor significantly decreased pain perception and enhanced maternal satisfaction with pain management. Furthermore, a study by Akbarzadeh et al. (2014) in Iran found that counterpressure massage on the sacral area during the active phase of labor resulted in significant pain relief and reduced the need for pharmacological interventions. These findings provide strong evidence supporting the integration of counterpressure as a safe, accessible, and effective non-pharmacological pain management strategy that can be easily implemented by midwives, nurses, or trained birth companions to enhance the quality of intrapartum care and promote positive childbirth experiences.

Table 4. Analysis of the Effect of Effleurage Technique on Maternal Anxiety During Labor (n=18)

	Anxiety Pre and Post Effleurage Technique	Mean	S. D	P value
1	Pre-effleurage technique anxiety	6.89	.832	< 0.01
2	Post-effleurage technique anxiety	4.33	1.414	

Table 4 demonstrates the significant effectiveness of the effleurage technique in reducing maternal anxiety during the active phase of the first stage of labor. The results indicated that the mean anxiety score before the effleurage intervention was 6.89 (SD = 0.832), representing moderate to severe anxiety levels, which decreased substantially to 4.33 (SD = 1.414) after the intervention, indicating mild to moderate anxiety. Statistical analysis revealed a p-value of < 0.01, confirming a highly significant effect of the effleurage technique on anxiety reduction among laboring mothers. This finding suggests that effleurage, through its gentle, rhythmic stroking movements, not only provides physical comfort but also promotes psychological relaxation by triggering the release of endorphins and oxytocin while reducing cortisol levels, thereby creating a calming effect that alleviates anxiety and fear during labor (Field, 2014; Uvnäs-Moberg et al., 2015).

The anxiety-reducing effect observed in this study is consistent with research by Chang et al. (2002), who found that massage therapy during labor significantly decreased anxiety levels and enhanced maternal emotional well-being. Similarly, Tournaire and Theau-Yonneau (2007) reported that complementary approaches including effleurage massage effectively reduced psychological distress and improved coping mechanisms during childbirth. Furthermore, a systematic review by Smith et al. (2018) concluded that massage and touch-based interventions during labor not only reduced pain but also significantly decreased maternal anxiety, fear, and stress responses, contributing to more positive birth experiences. Research by Bastani et al. (2016) additionally demonstrated that effleurage massage performed during the active phase of labor resulted in lower anxiety scores and improved maternal satisfaction with the birthing process. These findings underscore the importance of incorporating effleurage as a holistic, evidence-based intervention in maternity care that addresses both the physical and psychological dimensions of childbirth, empowering women to experience labor with reduced anxiety and enhanced emotional comfort.

Table 5. Analysis of the Effect of Counterpressure Technique on Maternal Anxiety During Labor (n=18)

Anxiety Pre and Post Counterpressure Technique	Mean	S.D	P-Value
1. Pre-counterpressure technique anxiety	6.78	.878	< 0.01
2. Post-counterpressure technique anxiety	4.22	1.353	

Table 5 reveals the significant effectiveness of the counterpressure technique in reducing maternal anxiety during the active phase of the first stage of labor. The findings demonstrated that the mean anxiety score before the counterpressure intervention was 6.78 (SD = 0.878), categorized as moderate to severe anxiety, which decreased substantially to 4.22 (SD = 1.353) after the intervention, indicating mild to moderate anxiety levels. Statistical analysis showed a p-value of < 0.01, confirming a highly significant effect of the counterpressure technique on anxiety reduction among labouring mothers. This finding suggests that counterpressure, through its application of firm, sustained pressure to the sacral area, not only alleviates physical pain but also provides psychological comfort by offering a sense of support, control, and active coping, which are crucial factors in reducing anxiety during the stressful experience of childbirth (Simkin & Ancheta, 2017).

The anxiety-reducing effect of counterpressure can be attributed to the interconnection between pain and anxiety, where effective pain relief through physical touch simultaneously reduces the psychological distress associated with labor, while the supportive presence and therapeutic touch inherent in the technique promote feelings of safety and reassurance (Klomp et al., 2012). These results are consistent with research by Hosseini et al. (2013), who found that supportive interventions including massage and pressure techniques during labor significantly reduced maternal anxiety and enhanced psychological well-being. Similarly, a study by Gentz (2001) demonstrated that continuous supportive touch and counterpressure during labor decreased anxiety levels and improved women's perceptions of control and coping ability. Furthermore, research by Leap et al. (2010) emphasized that hands-on comfort measures such as counterpressure not only manage pain but also address the emotional and psychological dimensions of labor by reducing fear, anxiety, and feelings of helplessness. A randomized controlled trial by Akbarzadeh et al. (2014) additionally confirmed that sacral pressure application during labor resulted in significant reductions in both pain and anxiety scores compared to routine care. These findings collectively support the integration of counterpressure as a holistic, evidence-based intervention that addresses the biopsychosocial aspects of childbirth, promoting both physical comfort and emotional well-being while empowering women to experience labor with reduced anxiety and enhanced confidence.

Table 6. Comparison of the Effectiveness of Counterpressure and Effleurage Techniques on Anxiety (n=18)

Difference in Anxiety Post Counterpressure and Post Effleurage Technique	Mean	S.D	P-Value
Post-counterpressure technique	2.56	1.294	1.000
Post-effleurage technique	2.56	1.542	

Table 6 presents a comparative analysis of the effectiveness of counterpressure and effleurage techniques in reducing maternal anxiety during labor, revealing no significant difference between the two interventions. The findings demonstrated that both techniques produced identical mean anxiety reduction scores of 2.56 points, with standard deviations of 1.294 for counterpressure and 1.542 for effleurage, and a p-value of 1.000, indicating that both interventions were equally effective in alleviating anxiety among laboring mothers. This result suggests that while both counterpressure and effleurage operate through different mechanisms—counterpressure through firm, sustained pressure on the sacral area and effleurage through gentle, rhythmic stroking—they are equally efficacious in addressing the psychological distress associated with childbirth by activating similar neurophysiological pathways related to comfort, relaxation, and stress reduction (Field, 2014; Simkin & Ancheta, 2017). The comparable effectiveness of these techniques can be

explained by their shared foundation in therapeutic touch and the gate control theory, whereby tactile stimulation not only blocks pain signals but also triggers the release of endorphins and oxytocin while reducing cortisol levels, thereby promoting both physical comfort and emotional well-being (Melzack & Wall, 1965; Uvnäs-Moberg et al., 2015).

These findings align with research by Jones et al. (2012), who reported that various massage and touch-based interventions during labor demonstrated similar effectiveness in reducing anxiety and enhancing maternal coping, suggesting that the therapeutic benefit may derive more from the provision of supportive, caring touch itself rather than the specific technique employed. Similarly, a systematic review by Smith et al. (2018) concluded that different forms of massage therapy during labor showed comparable effects on psychological outcomes, with no single technique demonstrating clear superiority over others. Furthermore, research by Tournaire and Theau-Yonneau (2007) emphasized that the effectiveness of complementary pain management techniques depends not only on the physical intervention but also on factors such as the quality of the therapeutic relationship, the woman's preferences, and the continuity of supportive care. These results suggest that healthcare providers can confidently offer either counterpressure or effleurage based on individual patient preferences, clinical presentation, or the specific nature of labor discomfort, as both techniques provide equally valuable anxiety reduction benefits and can be integrated flexibly into individualized, woman-centered maternity care protocols.

Table 7. Comparison of the Effectiveness of Counterpressure and Effleurae Techniques on Pain

Difference in Pain Post Counterpressure and Post Effleurage Technique	Mean	S.D	P-Value
Post-counterpressure technique	2.33	1.029	< 0.01
Post-effleurage technique	4.82	.786	

Table 7 presents a comparative analysis of the effectiveness of counterpressure and effleurage techniques in reducing labor pain, revealing a significant difference in their pain reduction efficacy. The findings demonstrated that the mean pain reduction score for the counterpressure technique was 2.33 (SD = 1.029), while the effleurage technique achieved a higher mean pain reduction score of 4.82 (SD = 0.786), with a p-value of < 0.01, indicating that effleurage was significantly more effective than counterpressure in alleviating labor pain during the active phase of the first stage. This superior pain reduction effect of effleurage can be attributed to its comprehensive mechanism of action, which combines gentle, rhythmic stroking movements across broader surface areas of the abdomen, back, and thighs, thereby activating multiple sensory nerve pathways simultaneously and providing more extensive sensory stimulation that effectively blocks pain transmission through the gate control mechanism (Melzack & Wall, 1965; Field, 2014).

Additionally, effleurage promotes deeper relaxation, reduces muscle tension, and enhances the release of endorphins and oxytocin while decreasing stress hormones, creating a more profound analgesic effect compared to the more localized pressure application of counterpressure (Uvnäs-Moberg et al., 2015). While counterpressure is particularly effective for addressing specific lower back pain caused by posterior fetal positioning and sacral pressure, effleurage provides broader pain relief by addressing multiple sources of labor discomfort including uterine contractions, cervical dilation, and generalized muscular tension (Simkin & Ancheta, 2017). These findings are consistent with research by Smith et al. (2018), who reported that massage techniques involving broader surface contact and rhythmic movements demonstrated superior pain reduction outcomes compared to localized pressure techniques. Similarly, a study by Chang et al. (2002) found that continuous massage therapy during labor resulted in significantly lower pain scores and reduced analgesic requirements compared to other non-pharmacological interventions.

Furthermore, research by Mortazavi et al. (2012) indicated that while various manual techniques provide pain relief, those involving gentle, continuous stroking movements tend to produce more substantial and sustained pain reduction effects. However, it is important to note that counterpressure remains a valuable intervention, particularly for women experiencing significant back labor or those who prefer firm pressure over light touch, and clinical decisions should consider individual patient preferences, pain characteristics, and the specific presentation of labor (Jones et al., 2012; Leap et al., 2010). These findings suggest that while effleurage may be considered the more effective first-line non-pharmacological intervention for general labor pain management, healthcare providers should maintain flexibility in applying both techniques either independently or in combination based on individual assessment and patient response to optimize pain relief and maternal comfort throughout the labor process.

CONCLUSION

Based on the research findings and discussion regarding the differential effects of counterpressure and effleurage techniques on pain and anxiety among mothers in the active phase of the first stage of labor at Hermina Banyumanik Hospital Semarang, the following conclusions can be drawn. The characteristics of laboring mothers in the active phase of the first stage showed that the majority of respondents were within the healthy reproductive age range of 20–36 years, most had bachelor's degree education, were multiparous, and had cervical dilation of 4–6 cm. Both effleurage and counterpressure techniques significantly reduced pain and anxiety levels among mothers during the active phase of the first stage of labor, demonstrating their effectiveness as non-pharmacological interventions to enhance maternal comfort during childbirth.

Comparative analysis revealed a significant difference in pain reduction efficacy between the two techniques, with effleurage proving more effective than counterpressure in alleviating labor pain; however, no significant difference was found between the two techniques in reducing maternal anxiety, indicating that both interventions are equally beneficial for managing the psychological distress associated with labor. These findings support the integration of both effleurage and counterpressure techniques as evidence-based, safe, and accessible non-pharmacological strategies in maternity care, with the selection of technique guided by individual patient preferences, pain characteristics, and clinical presentation to optimize pain management and maternal satisfaction during the childbirth experience.Counterpressure and effleurage techniques effectively reduce pain and anxiety among women in the active phase of the first stage of labor. Effleurage may be considered as a preferred non-pharmacological intervention for pain management during childbirth.

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