

EFFECTIVENESS OF DEEP BACK MASSAGE IN REDUCING FIRST-STAGE LABOR PAIN AMONG WOMEN IN ACTIVE LABOR: A PRE-EXPERIMENTAL STUDY

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ABSTRACT

This study aims to determine the effect of deep back massage on pain intensity in laboring mothers during the first stage of labor. This study employed a pre-experimental one-group pretest–posttest design and was conducted among women in the active phase of the first stage of labor at Tanjung Balai Karimun Community Health Center, Indonesia. A total of 30 laboring women participated in the study. Pain intensity was assessed using the Visual Analogue Scale (VAS) before and after the administration of deep back massage. The intervention was administered during the active phase of the first stage of labor. Data were analyzed using the paired-samples t-test after assessment of the normality assumption using the Shapiro–Wilk test. The results showed a significant decrease in pain levels from an average of 7.6 before the intervention to 5.2 after the intervention ($p < 0.001$). It is concluded that deep back massage is effective in reducing labor pain during the first stage. deep back massage may be considered as a complementary non-pharmacological approach."

Keywords : deep back massage, labor pain, first stage, non-pharmacological

INTRODUCTION

Childbirth is a complex physiological process influenced by the interaction of maternal and fetal factors, the birth canal, uterine contractions, and the mother's psychological condition. During labor, particularly in the active phase of the first stage, women experience physiological and psychological changes that may influence their perception of pain and the progression of labor. The World Health Organization (WHO) emphasizes that a positive childbirth experience is determined not only by maternal and neonatal outcomes but also by the ability of health professionals to provide appropriate physical and emotional support and effective pain management throughout labor (WHO, 2023).

Labor pain is a subjective sensory and emotional experience resulting from uterine contractions, cervical dilatation, stretching of the lower uterine segment, and fetal descent. Pain intensity generally increases as cervical dilatation progresses and uterine contractions become more frequent. The perception of labor pain is influenced by several factors, including parity, age, anxiety, family support, previous childbirth experiences, cultural background, and psychological condition. Inadequately managed labor pain may increase sympathetic nervous system activity, resulting in increased catecholamine release, uteroplacental vasoconstriction, impaired uterine perfusion, maternal fatigue, and potentially prolonged labor (American College of

Obstetricians and Gynecologists [ACOG], 2024; Smith et al., 2022).

Previous studies have shown that many women experience moderate to severe pain during the first stage of labor. Uncontrolled labor pain not only increases maternal discomfort but is also associated with increased anxiety and stress, greater need for pharmacological analgesia, and a less positive childbirth experience. Therefore, contemporary midwifery care promotes a woman-centered care approach that focuses on maternal comfort, safety, and positive childbirth experiences through the integration of pharmacological and non-pharmacological interventions (WHO, 2023; FIGO, 2023).

Non-pharmacological interventions have increasingly been recommended as an approach to labor pain management because they are generally safe, relatively simple to administer, cost-effective, and do not expose mothers and newborns to the potential adverse effects associated with pharmacological analgesia. One intervention that has received considerable research attention is deep back massage, a massage technique applied to the sacral region to reduce discomfort associated with fetal descent, promote muscle relaxation, improve local blood circulation, and reduce the perception of pain. The proposed mechanism of deep back massage is consistent with the Gate Control Theory, in which mechanical stimulation of large-diameter nerve fibers, particularly A-beta fibers, may inhibit the transmission of nociceptive impulses to the central nervous system and consequently reduce pain perception. Massage may also stimulate the release of endorphins, which function as endogenous analgesics and contribute to relaxation and maternal comfort during labor (Karaduman & Akköz Çevik, 2020; Cahyanto et al., 2020).

Recent studies have reported that deep back massage can significantly reduce pain intensity during the first stage of labor, decrease maternal anxiety, promote

relaxation, and improve the childbirth experience compared with standard care alone. Agustini et al. (2021) reported a significant reduction in labor pain following the administration of deep back massage. Similarly, Ambarita and Ulfah (2022) demonstrated that the deep back massage method was effective in reducing pain intensity during the first stage of labor. A systematic review and Bayesian network meta-analysis by Hu et al. (2021) further demonstrated that non-pharmacological interventions, including massage-based interventions, can provide beneficial effects in the management of labor pain. These findings support the potential role of massage as a complementary intervention in evidence-based midwifery care.

Despite the growing evidence supporting the effectiveness of deep back massage, its implementation in primary maternal healthcare settings remains limited. Based on a preliminary survey conducted by the researchers in November 2024 at Tanjung Balai Karimun Community Health Center, deep back massage had not been routinely implemented as part of non-pharmacological pain management for women in the first stage of labor. This condition indicates a gap between evidence-based recommendations and their implementation in routine midwifery practice. Therefore, further research is needed to evaluate the effectiveness of deep back massage in reducing labor pain within a primary healthcare setting.

Based on this background, this study aimed to analyze the effect of deep back massage on pain intensity among women in the active phase of the first stage of labor at Tanjung Balai Karimun Community Health Center in 2025. The findings are expected to provide scientific evidence supporting the implementation of deep back massage as a safe, accessible, and complementary intervention within woman-centered maternity care and to contribute to improving the quality of

intrapartum care in primary healthcare facilities.

RESEARCH OBJECTIVES

General Objective

The general objective of this study was to determine the effect of deep back massage on reducing pain intensity among women in the active phase of the first stage of labor.

Specific Objectives

The specific objectives of this study were:

1. To determine the intensity of labor pain before the administration of deep back massage among women in the active phase of the first stage of labor.
2. To determine the intensity of labor pain after the administration of deep back massage among women in the active phase of the first stage of labor.
3. To analyze the effect of deep back massage on labor pain intensity among women in the active phase of the first stage of labor.

RESEARCH METHODS

Research Design

This study employed a quantitative research approach. Quantitative research is an approach that generates findings through statistical procedures or other forms of quantification and measurement. The study used a pre-experimental design with a one-group pretest–posttest design.

In this design, a single group of women in the active phase of the first stage of labor was observed before and after the intervention. First, the participants' labor pain intensity was assessed as a pretest measurement. Subsequently, the participants received the complementary intervention of deep back massage as a non-pharmacological approach to labor pain management. After the intervention, labor pain intensity was assessed again as a posttest measurement. The pretest and posttest pain intensity scores were then compared to determine whether the administration of deep back massage was

associated with a reduction in labor pain intensity.

RESULTS

Normality Test of Pain Scores Using the Shapiro–Wilk Test

Before conducting inferential analysis using the paired-samples t-test, a normality test was performed using the Shapiro–Wilk test to determine whether the pain score data were normally distributed. The normality test was conducted on the pain scores measured before and after the intervention. The results of the Shapiro–Wilk normality test are presented in

Table 1 Normality Test of Pain

Variable	Statistic	df	Sig. (p value)
Pre-intervention Pain Score	0,964	30	0,338
Post-intervention Pain Score	0,957	30	0,214

Based on the results of the Shapiro–Wilk test, the significance value for the pain scores before the intervention was 0.338, while the significance value for the pain scores after the intervention was 0.214. Both values were greater than 0.05, indicating that the pain score data were normally distributed. Therefore, the data met the normality assumption and could be further analyzed using a parametric test, namely the paired-samples t-test.

Pain Intensity During the First Stage of Labor Before Deep Back Massage

Before the deep back massage intervention was administered, the participants' pain intensity was assessed using the Visual Analogue Scale (VAS), with scores ranging from 0 to 10. The results of the pain intensity assessment are presented in

Table 2 Pain Intensity During the First Stage of Labor Before Deep Back Massage

VAS Score (0–10)	n	Percentage	Mean ± SD
4 – 5	4	13,3 %	7,6 ± 1,2
6 – 7	15	50,0 %	
8 – 10	11	36,7 %	

The majority of participants (50.0%) reported pain with VAS scores ranging from 6 to 7, which was categorized as moderate pain. Meanwhile, 36.7% of participants experienced severe pain, with VAS scores ranging from 8 to 10. The mean pain score before the intervention was 7.6 ± 1.2 , indicating a relatively high level of pain during the first stage of labor prior to the administration of non-pharmacological pain management.

Pain Intensity During the First Stage of Labor After Deep Back Massage

Following the deep back massage intervention, the participants' pain intensity was reassessed using the Visual Analogue Scale (VAS). The results demonstrated a reduction in pain intensity among the majority of participants.

Table 3 Pain Intensity During the First Stage of Labor After Deep Back Massage

VAS Score (0–10)	n	Percentage	Mean ± SD
2 – 3	5	16,7 %	5,2 ± 1,3
4 – 5	17	56,7 %	
6 – 7	8	26,6 %	

The majority of participants (56.7%) reported mild to moderate pain (VAS scores of 4–5) after the intervention. In addition, 16.7% of participants experienced a reduction in pain intensity to scores of 2–3. The mean pain score decreased to 5.2 ± 1.3 , compared with the baseline mean of 7.6

± 1.2 . These findings indicate that the administration of deep back massage was associated with a reduction in pain intensity among women in the first stage of labor.

Paired Pre–Post t-Test

Statistical analysis was performed using a paired-samples t-test to determine whether there was a difference in the mean pain scores before and after the intervention.

Table 4 Paired Pre–Post t-Test

Variable	Mean Difference ± SD	t	p value
VAS Score (Pre – Post)	2,4 ± 1,4	9,39	< 0,001

The analysis showed a mean difference in pain scores of 2.4, with a standard deviation of 1.4. The calculated *t*-value was 9.39, with a *p*-value < 0.001, indicating a statistically significant difference (*p* < 0.05). Therefore, the findings demonstrate that deep back massage was effective in reducing pain intensity among women during the first stage of labor.

DISCUSSION

Pain Intensity Before the Intervention

Before the intervention, most participants experienced labor pain in the moderate-to-severe range, with a mean pain score of 7.6 ± 1.2 . This finding reflects the relatively high level of pain associated with the first stage of labor, particularly as uterine contractions become progressively stronger and cervical dilatation advances. Labor pain during this stage is primarily associated with uterine contractions, cervical dilatation, and stretching of the lower uterine segment, resulting in visceral pain that may radiate from the lower back to the lower abdomen. These physiological changes may contribute to maternal discomfort, muscle tension, and fatigue during labor.

Primigravida women may be more likely to perceive labor pain intensely because they have limited previous experience with the physiological and psychological demands of childbirth. Anxiety and fear associated with unfamiliar labor sensations may increase pain perception and reduce maternal coping capacity. Previous research has indicated that psychological factors, particularly anxiety and fear, can interact with physiological mechanisms and influence women's experiences of labor pain. Therefore, adequate information, emotional support, and continuous assistance are important components of intrapartum care, particularly for women experiencing childbirth for the first time.

In addition to parity and psychological factors, physiological mechanisms occurring during labor also contribute to pain perception. Uterine contractions, cervical dilatation, tissue stretching, and fetal descent activate nociceptive pathways associated with labor pain. Psychological stress may further increase sympathetic nervous system activity and catecholamine release, potentially contributing to muscle tension and altered maternal responses to pain. Consequently, management of labor pain should address not only the physical stimulus but also the psychological and emotional condition of the mother.

The relatively high level of pain observed in this study may also be associated with the duration and intensity of the active phase of the first stage of labor. Prolonged or intense contractions can contribute to maternal fatigue, irritability, and reduced coping capacity. Maternal fatigue may subsequently make it more difficult for women to manage pain and maintain effective coping strategies throughout labor. Therefore, continuous assessment of maternal pain and comfort is essential during cervical dilatation, particularly when pain intensity increases progressively.

Given the high level of pain experienced during the first stage of labor, non-pharmacological interventions such as deep back massage represent a practical complementary approach to pain management. Massage provides tactile and mechanical stimulation that may help reduce the perception of pain while promoting maternal relaxation. In addition to its potential physiological effects, therapeutic touch may provide psychological benefits by increasing feelings of comfort, support, and reassurance during labor. Evidence from previous studies supports the use of massage-based interventions as part of non-pharmacological pain management during labor. Thus, the use of deep back massage is relevant to contemporary, woman-centered, and evidence-based midwifery care.

Pain Intensity After Deep Back Massage

Following the deep back massage intervention, the mean pain score decreased from 7.6 ± 1.2 to 5.2 ± 1.3 . This reduction indicates an improvement in maternal pain intensity following the intervention. The finding is consistent with the potential role of back massage as a non-pharmacological approach to labor pain management. Massage provides tactile and mechanical stimulation that may modify pain perception and promote relaxation during labor.

One possible mechanism underlying the effect of deep back massage is explained by the Gate Control Theory of Pain. Mechanical stimulation produced by massage may activate large-diameter sensory nerve fibers, which can modulate nociceptive transmission at the spinal level and subsequently reduce the perception of pain. In addition, massage may promote relaxation and contribute to the release of endogenous analgesic substances, including endorphins, which may further support maternal comfort during labor. Previous research has reported beneficial

effects of massage-based interventions on labor pain, supporting their use as complementary approaches to intrapartum pain management (Hu et al., 2021; Karaduman & Akköz Çevik, 2020).

The effects of massage may also involve psychological mechanisms. Therapeutic touch can provide a sense of comfort, reassurance, and emotional support, which may help women cope with contractions more effectively. Reduced anxiety and increased relaxation may consequently influence the subjective perception of pain. This is particularly relevant during the active phase of the first stage of labor, when uterine contractions become increasingly intense and frequent. Thus, pain management should address both the physiological and psychological dimensions of the childbirth experience.

The findings of this study are consistent with previous research demonstrating the potential benefits of back and sacral massage during labor. Agustini et al. (2021) reported a significant reduction in labor pain following deep back massage among women in the first stage of labor. Similarly, Ambarita and Ulfah (2022) found that the deep back massage method was associated with reduced pain intensity during the first stage of labor. Evidence from systematic reviews and meta-analyses also indicates that non-pharmacological interventions, including massage, can contribute to the management of labor pain (Choudhary et al., 2021; Hu et al., 2021).

The practical advantages of deep back massage are also important in midwifery care. The intervention is relatively simple, does not require specialized equipment, and can be incorporated into routine intrapartum care. Its application may therefore be particularly relevant in primary healthcare facilities where access to pharmacological analgesia or specialized pain-management services may be limited. When appropriately administered, massage can be integrated with other supportive measures to promote

maternal comfort and a positive childbirth experience.

Effect of Deep Back Massage on Labor Pain Intensity

The statistical analysis demonstrated a significant difference in pain intensity before and after the intervention. The mean pain score decreased from 7.6 ± 1.2 before the intervention to 5.2 ± 1.3 after the intervention, with a mean difference of 2.4 ± 1.4 and a p-value < 0.001 based on the paired-samples *t*-test. These findings indicate a statistically significant reduction in labor pain intensity following the administration of deep back massage.

The observed reduction may be explained by the combined physiological and psychological effects of massage. From a neurophysiological perspective, tactile stimulation generated by massage may modulate nociceptive signals at the spinal level through the mechanism described by the Gate Control Theory. At the same time, the physical contact associated with massage may facilitate relaxation and reduce muscle tension, thereby helping women cope with uterine contractions more comfortably.

The psychological component of the intervention should also be considered. Labor pain is a multidimensional experience influenced not only by physiological stimuli but also by anxiety, fear, previous experience, emotional support, and individual coping mechanisms. A supportive and reassuring interaction between the midwife and the woman during massage may therefore contribute to improved pain coping and maternal comfort. This is consistent with the principles of woman-centered maternity care, which emphasize respectful, individualized, and supportive care throughout childbirth (World Health Organization, 2018, 2023).

The findings are also supported by previous studies. Agustini et al. (2021) found that deep back massage was

associated with a reduction in the intensity of first-stage labor pain. Ambarita and Ulfah (2022) similarly reported beneficial effects of the deep back massage method on pain intensity during the first stage of labor. Furthermore, Choudhary et al. (2021) reported evidence supporting back massage as a non-pharmacological intervention for relieving labor pain, while Hu et al. (2021) demonstrated that non-pharmacological interventions can contribute to effective labor pain management.

The results have practical implications for midwifery services. Because deep back massage is relatively inexpensive, requires minimal equipment, and can be performed as part of supportive intrapartum care, it may be a feasible complementary intervention in primary healthcare settings. Midwives can incorporate the technique into individualized pain-management plans according to the woman's preferences, comfort, and clinical condition.

However, the findings should be interpreted according to the study design. This study used a one-group pretest–posttest design without a control group. Therefore, although the significant pre–post reduction suggests that pain intensity decreased after the intervention, the study cannot establish with certainty that the entire reduction was attributable exclusively to deep back massage. Other factors associated with the natural progression of labor, changes in contraction intensity, maternal adaptation, emotional support, and the passage of time may also have contributed to changes in pain perception. Further studies using randomized controlled designs and appropriate comparison groups are needed to strengthen the evidence regarding the independent effect of deep back massage.

Overall, the findings indicate that deep back massage was associated with a significant reduction in labor pain intensity among women in the first stage of labor. The intervention may therefore serve as a

complementary component of woman-centered, non-pharmacological pain management. Its integration into routine midwifery practice should be accompanied by appropriate assessment of maternal condition, individual preferences, and clinical safety to support a more comfortable and positive childbirth experience.

CONCLUSION

This study demonstrated a statistically significant reduction in labor pain intensity following the administration of deep back massage during the first stage of labor. The mean pain score decreased from 7.6 ± 1.2 before the intervention to 5.2 ± 1.3 after the intervention, with a statistically significant difference ($p < 0.001$). These findings suggest that deep back massage may be a useful complementary non-pharmacological intervention for reducing labor pain and promoting maternal comfort during childbirth. Given its simplicity, minimal equipment requirements, and feasibility for implementation in primary healthcare settings, deep back massage may be incorporated into woman-centered midwifery care. However, because this study employed a one-group pretest–posttest design without a control group, further controlled studies are needed to confirm the independent effect of deep back massage on labor pain intensity.

RECOMMENDATIONS

1. For healthcare professionals: Midwives and other maternity healthcare professionals are encouraged to consider deep back massage as a complementary non-pharmacological intervention for labor pain management, according to maternal preferences and clinical conditions.
2. For educational institutions: Midwifery education institutions are

encouraged to incorporate deep back massage techniques into practical learning and skills training as part of evidence-based, woman-centered intrapartum care.

3. For women and families: Pregnant women and their families should receive appropriate education regarding non-pharmacological approaches to labor pain management, including the potential benefits and proper application of deep back massage.
4. For future researchers: Further research should investigate deep back massage using randomized controlled designs, larger sample sizes, and comparison groups. Future studies may also evaluate its combination with other non-pharmacological interventions, such as breathing techniques, relaxation therapy, or other supportive measures.
5. For policymakers and healthcare institutions: Healthcare institutions and policymakers may consider incorporating evidence-based non-pharmacological pain-management interventions, including deep back massage, into standard operating procedures for holistic and woman-centered maternity care.

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