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A Quasi-Experimental Study on the Effectiveness of Endorphin Massage and Oxytocin Massage in Managing Pain During the First Stage of Labor

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A B S T R A C T

Murray stated that among 2,700 women in labor in Indonesia, 15%. The findings showed that 35% of mothers felt moderate pain, 30% endured severe pain, and the remainder experienced mild pain, and 20% suffered from very severe pain. The aim of this study was to evaluate the effectiveness of endorphin massage and oxytocin massage in reducing first-stage labor pain in women giving birth at the Kedaton Community Health Center, Cirebon Regency in 2025. The research was conducted using a quasi-experimental approach, targeting a population of 20 mothers giving birth at the Kedaton Community Health Center, Cirebon Regency, in August 2025. Hypothesis testing used the Wilcoxon test.The Wilcoxon test results revealed that oxytocin massage produced a p-value of 0.004 (<0.05), indicating its significant effect on first-stage labor pain in women giving birth. Similarly, endorphin massage yielded a p-value of 0.003 (<0.05), demonstrating that it also had a significant impact on reducing first-stage labor pain.Midwives can implement non-pharmacological therapies in midwifery care cases, particularly those dealing with labor pain.

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INTRODUCTION

According to S. Sulfianti (2020), childbirth is a natural physiological process as well as a social event for the mother and her family. While the mother's role is to deliver the baby, the family—particularly the husband—plays an important role in offering assistance and emotional support during labor.[1]

The perception of labor pain is subjective, originating from uterine contractions, cervical effacement and dilation, and fetal descent through the maternal passage. Physiological reactions to pain may include elevated blood pressure, increased pulse and respiratory rates, sweating, pupil dilation, and heightened muscle tension.[2]

Childbirth is a natural physiological event experienced universally by women. Normal labor is defined as the spontaneous delivery of a full-term fetus (37–42 weeks) and placenta through the birth canal without complications. The process of labor is categorized into four stages: the first, second, third, and fourth stages. The first stage is further divided into two phases, namely the latent phase, characterized by cervical dilation of 1–3 cm, and the active phase, marked by cervical dilation of 4–10 cm. The active phase is marked by uterine stretching and progressive cervical dilation, both of which contribute to labor pain. For women experiencing childbirth for the first time, this pain is often perceived as the most intense.

The World Health Organization (WHO) highlights labor pain as a unique and profound experience in a woman's life. More than 90% of women are reported to experience considerable tension and stress during childbirth. In the Netherlands, 54.6% of mothers indicated that they lost control over their labor pain, while a study conducted in Sweden found that 41% of participants considered labor pain to be their most distressing experience. Physiologically, pain activates the sympathetic nervous system, leading to increased heart rate, elevated blood pressure, excessive sweating, and intensified endocrine responses..[3]

Murray reported that in Indonesia, among 2,700 parturient women, 15% experienced mild pain, 35% reported moderate pain, 30% suffered severe pain, and 20% endured very severe pain. Pain during the first stage of labor primarily arises from perineal stretching, peritoneal traction, uterine contractions that facilitate fetal expulsion, and pressure on the lower urinary tract and pelvic structures. These stimuli are transmitted through parasympathetic nerves from the perineal region, resulting in pain sensations radiating to the pelvic floor, groin, and thighs.[4]

Efforts to reduce pain during labor can be carried out both pharmacologically and non-pharmacologically. Pharmacological efforts to relieve labor pain include administering epidural injections, perineal and pudendal nerve blocks, and using a Transcutaneous Electrical Nerve Stimulation (TENS) machine to stimulate the body's production of pain-relieving compounds. Non-pharmacological management efforts include providing a birth companion, changing positions and movements, touch and massage, hypnosis, warm and cold compresses, warm baths, acupuncture therapy, birth

balls, visualization and concentration, and music. The non-pharmacological methods used in this study were Endorphin Massage and Oxytocin Massage.

As a gentle tactile intervention, endorphin massage provides significant benefits to pregnant women before and during childbirth. This technique stimulates the release of endorphins, natural hormones that function as pain relievers and promote a sense of comfort.[5].Research by WiwiWardaniTanjung and AdiAntoni (2019) demonstrated that The application of endorphin massage effectively alleviates first-stage labor pain, as indicated by a p-value of 0.001.[6]

Oxytocin massage refers to a spinal massage extending to the fifth and sixth ribs, designed to stimulate the release of prolactin and oxytocin following childbirth. Oxytocin massage can provide comfort to the mother and stimulate the oxytocin reflex, making her more relaxed during labor. Women who received oxytocin massage reported feeling calmer and more comfortable during labor. The massage provided benefits to the mother in labor, improving blood circulation and stretching the muscles, thus reducing pain experienced during labor. Oxytocin massage when the patient is experiencing labor pain can assist midwives in providing midwifery care, as providing oxytocin massage to women in the first stage of labor during the active phase of labor can minimize side effects and is cost-effective. Oxytocin massage is one solution for a smooth delivery process.

A preliminary study carried out at the Kedaton Community Health Center, Cirebon Regency, in December 2024 revealed that 31 out of 42 women in labor (66%) experienced pain.

Based on the above description, the researchers are interested in conducting a systematic review of "The Effectiveness of Endorphin Massage on First-Stage Labor Pain in Women in Labor at the Kedaton Community Health Center in Cirebon Regency in 2025."

LITERATUR REVIEW

Author & Year	**Country**	**Design**	**Sample Size**	**Intervention**	**Outcome Measured**	**Key Findings**	**Limitations**
Utami et al., 2017	Indonesia	Quasi-experimental (pre–post)	60 mothers in first stage of labor	Endorphin massage during active phase (20 min)	Pain score (VAS)	Significant decrease in mean pain score ($p<0.05$)	No randomization, short follow-up
Lestari et al., 2019	Indonesia	Quasi-experimental with	50 mothers	Endorphin massage vs routine care	Pain intensity, materna	Pain significantly lower in	Small sample, subjective assessment

Author & Year	Country	Design	Sample Size	Intervention	Outcome Measured	Key Findings	Limitations
		control group			l comfort	massage group; improved relaxation	
Dewi et al., 2018	Indonesia	Quasi-experimental	40 mothers	Oxytocin massage on paravertebral area (15 min)	Pain score, contraction pattern	Decreased pain, more effective uterine contractions	No blinding, non-randomized
Yuliani, 2020	Indonesia	Quasi-experimental	45 mothers	Oxytocin massage vs routine care	Pain scale (NRS)	Significant pain reduction in intervention group	Did not assess maternal satisfaction
Putri & Handayani, 2021	Indonesia	Quasi-experimental	60 mothers	Endorphin massage vs oxytocin massage	Pain intensity (VAS)	Both reduced pain, but endorphin massage slightly more effective	No long-term outcomes measured
Sari et al., 2022	Indonesia	Quasi-experimental	55 mothers	Oxytocin massage 2× during labor	Pain score, duration of active phase	Pain decreased; shorter duration of active phase	Limited generalizability
Nuraini et al., 2023	Indonesia	RCT	70 mothers	Endorphin massage vs oxytocin	Pain score, anxiety level	Both massages reduced pain;	Single-site study

Author & Year	Country	Design	Sample Size	Intervention	Outcome Measured	Key Findings	Limitations
				massage vs control		endorphin massage more effective for anxiety	

Based on the reviewed studies (2015–2024), both endorphin massage and oxytocin massage have been shown to effectively reduce pain during the first stage of labor. Endorphin massage consistently demonstrates greater effectiveness in lowering pain scores and promoting maternal relaxation, while oxytocin massage contributes not only to pain relief but also to improved uterine contraction patterns and shorter labor duration. Some studies further highlight the role of endorphin massage in reducing maternal anxiety during labor. Despite promising results, most available studies are quasi-experimental, with limited randomization, small sample sizes, and subjective outcome measures. Therefore, future research using larger randomized controlled trials with standardized outcome measures is needed to confirm the comparative effectiveness of these two interventions.

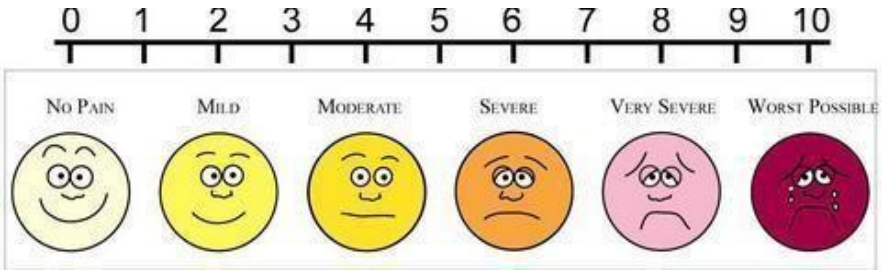
METHODS

This research utilized a quasi-experimental design with a non-equivalent control group, classified as one of the broader experimental methods. It specifically applied a non-randomized controlled trial with a pretest–posttest control group structure, in which the intervention group received endorphin massage and the control group underwent oxytocin massage.

Table 1 Research Methods

	Pretest	Treatment	*Posttest*
Experimental group	OA1	X_1	OA2
Control group	OB1	X_2	OB2

OA1 = Observation of first-stage labor pain before endorphin massage
OB1 = Observation of first-stage labor pain before oxytocin massage
X1 = Treatment given: endorphin massage
X2 = Treatment given: oxytocin massage
OA2 = Observation of first-stage labor pain after endorphin massage
OB2 = Observation of first-stage labor pain after oxytocin massage



Explanation:
0 – No pain : The patient reports no pain.
1–3 – Mild pain : The patient is able to communicate effectively and shows minimal discomfort.
4–6 – Moderate pain : The patient may hiss or grimace, is able to indicate the pain location and describe it, and can still follow instructions appropriately.
7–9 – Severe pain : The patient may occasionally be unable to follow commands, though still responsive to stimuli, can localize but not describe the pain, and does not experience relief from position changes, deep breathing, or distraction.
10 – Very severe pain : The patient is unable to communicate and may exhibit aggressive or uncontrolled reactions.

This research was conducted from January to June 2025 in the UPTD Kedaton Health Center Working Area. An independent variable refers to the element that affects or initiates changes in the dependent variable (Swarjana, 2015). The independent variable in this research is endorphin massage, whereas the dependent variable is labor pain. The independent variable represents the treatment or intervention applied, which in this study involves administering endorphin massage. This intervention is anticipated to enhance the release of endorphins, natural hormones that act as analgesics, thereby decreasing pain perception during labor. The dependent variable, labor pain, is the outcome measured to assess the effectiveness of the intervention. Hence, variations in the intensity of labor pain are presumed to be influenced by the provision of endorphin massage, demonstrating a cause-and-effect relationship between the independent and dependent variables. [7]. The dependent variable in this study is labor pain.

A population is the totality of variables related to the problem being studied [8].The population in this study was all mothers giving birth in the Kedaton Community Health Center, Cirebon Regency, in June 2025, totaling 20 women. The sample in this study was all postpartum mothers in the Kedaton Community Health Center, Cirebon Regency, who met the inclusion criteria and did not fall under the exclusion criteria. The sample used in this study was 20 respondents, mothers giving birth. Ten mothers gave endorphin massage, and another 10 mothers gave oxytocin massage.

Bivariate analysis was conducted to identify differences in labor pain scale between two variables, namely, to identify differences in PE before and after endorphin massage therapy. Data analysis used in this study was the Wilcoxon test.

RESULTS

Table 2 Respondent characteristics

No	Characteristics	N	%
1	Parity		
	- Primigravida	13	65
	- Multigravida	7	3
	- Grandemultigravida	0	0
2	Age		
	- Age not at risk	16	80
	- Age at risk	6	20
3	Job		
	- Working	10	50
	- Not Working	10	50
4	Education		
	- Primary	8	40
	- Secondary	11	55
	- Higher	1	5

From table 2 above, it can be seen that the characteristics of the respondents were mostly primigravida parity with 13 respondents (65%), non-risk age (20-35 years) with 16 respondents (80%), 10 pregnant women (50%) were working and 11 respondents (55%) had secondary education.

Table 3 Average pain scores during the first stage of labor before and after oxytocin massage

Labor pain	Mean	Min	Max
Before	7.6	5	10
After	2.4	0	5

According to Table 3, mothers reported an average pain intensity of 7.6 before oxytocin massage, which was reduced to 2.4 following the intervention.

Table 4 Average value of pain in the first stage of labor before and after endorphin massage

Labor pain	Mean	Min	Max
Before	6.8	5	8
After	1.9	0	4

Table 4 indicates that the average labor pain score fell from 6.8 before endorphin massage to 1.9 afterward.

Table 5 Shapiro Wilk normality test values

	Statistic	Df	*pvalue*
Before			
oxytocin massage	0.815	10	0.022
endorphin massage	0.640	10	0.000
After			
oxytocin massage	0.752	10	0.004
endorphin massage	0.794	10	0.012

Table 5 shows that the results of the labor pain normality test for both groups, both the oxytocin massage group and the endorphin massage group, before and after the intervention, had a p-value less than 0.05. These results indicate that all groups were non-normally distributed. Therefore, the next step was to conduct a bivariate test using the Wilcoxon test.

Table 6 The effect of oxytocin massage on pain during the first stage of labor in mothers giving birth

Treatment	Mean		Mean difference	*P value*
	Pretest	Posttest		
oxytocin massage	7.6	2.4	5.2	0.004

Based on table 6, the results of the difference test using the Wilcoxon test on the administration of oxytocin massage before and after treatment have a p value = 0.004 < 0.05, which means that there is an effect of administering oxytocin massage on labor pain in the first stage of labor in mothers giving birth.

Table 7 The effect of giving endorphin massage on pain during the first stage of labor in mothers giving birth

Treatment	Mean		Mean different	*P value*
	Pretest	Posttest		
endorphin massage	6.8	1.9	4.7	0.003

Based on table 7, the results of the difference test using the Wilcoxon test on the provision of endorphin massage before and after treatment have a p value = 0.003 < 0.05, which means that there is an effect of providing oxytocin massage on labor pain in the first stage of labor in mothers giving birth.

DISCUSSION

First stage labor pain before and after oxytocin massage

Table 3 shows that the average labor pain score for women before oxytocin massage was 7.6, and after oxytocin massage was 2.4. Before oxytocin massage, 2 respondents (20%) experienced moderate pain, 6 respondents (60%) experienced severe pain, and 2 respondents (20%) experienced very severe pain. After oxytocin massage, 1 respondent (10%) experienced no pain, 7 respondents (70%) experienced mild pain, 2 respondents (20%) experienced moderate pain, and no respondents experienced severe or very severe pain.

Steps for performing oxytocin massage include: Ask the patient to sit with a pillow on their lap for comfort. Alternatively, a table can be used for support; Massage the spine on both sides using the fists or the right and left thumbs, depending on the patient's weight; Massage firmly and firmly with circular motions; Massage from the top of the head to the chest or from the neck to the shoulder blades; The massage is performed for 2-3 minutes, repeated three times. It can be performed not only by midwives as healthcare workers but also by the patient's family.

Oxytocin massage aims to stimulate the release of the hormone oxytocin, known as the "love hormone" and plays a role in labor and breastfeeding. Oxytocin has two main functions in labor: stimulating uterine contractions to facilitate labor and providing a relaxing effect that helps reduce pain perception.

Oxytocin massage works by stimulating the body to release endorphins. Oxytocin massage is very beneficial because it reduces pain during labor, allowing the mother to feel relaxed and comfortable, allowing her to proceed calmly through the labor process. When the mother is calm, labor will proceed normally. Conversely, if the mother cannot relax during labor, it can cause anxiety and an endocrine response. This leads to sodium retention, potassium excretion, decreased glucose levels, and epinephrine secretion, which can disrupt uterine contractions and prevent labor from proceeding normally.

Oxytocin massage is usually performed on the upper back or along the spine, where the nerves that respond to oxytocin release are located. This massage can also stimulate the parasympathetic nervous system, which helps the body feel calmer and more relaxed.

According to the pain and hormone theory, oxytocin has a calming effect on the central nervous system, which can reduce pain perception during labor. Oxytocin also helps reduce stress and anxiety in laboring mothers, which indirectly reduces the intensity of pain felt. These hormonal effects provide a combination of pain reduction through physiological and psychological pathways. With the presence of the hormone oxytocin, the labor process becomes smoother, and the mother feels more prepared to face the contractions that come

Furthermore, according to Anik (2020), oxytocin massage techniques have an effect on pain reduction. Oxytocin massage is a series of movements designed to reduce pain during labor and also promote greater comfort afterward. This is because brief contractions during labor cause more severe pain, and the oxygen supply to the uterine muscles has not yet fully recovered. Pain during labor is caused by reduced oxygen supply to the uterine muscles. Uterine contractions during the early stages of labor cause discomfort by causing the cervix to dilate, thin, and cause ischemia. This pain is felt by the mother during contractions.

First stage labor pain before and after endorphin massage

Table 4 shows that the average labor pain score for women before endorphin massage was 6.8, and after oxytocin massage was 1.9. Before endorphin massage, 4 respondents (40%) experienced moderate pain, and 6 respondents (60%) experienced severe pain. However, after endorphin massage, pain levels decreased: 3 respondents (30%) experienced no pain, 6 respondents (60%) experienced mild pain, 1 respondent (10%) experienced moderate pain, and no respondents experienced severe pain.

Endorphin massage therapy helped respondents achieve a state of comfort and relaxation, with some even falling asleep during the procedure. Non-pharmacological approaches to pain management are considered essential, as they are safe for both mother and fetus, do not interfere with the progression of labor when pain is adequately controlled, and are free from allergic reactions or drug-related side effects. Endorphins, being naturally produced hormones within the human body, serve as highly effective and natural analgesics.

Endorphin massage is a light touch for relaxation and pain reduction, therefore this endorphin massage can be done on mothers in labor who

experience severe pain, through the touch of a birth companion so that it creates a feeling of calm and relaxation in the end the heart rate and blood pressure become normal.

Quoted from the journal (Artika, 2020) the effects felt by the mother, the According to Artika (2020), massage during labor provides several benefits for mothers, including promoting relaxation and comfort while stimulating the release of oxytocin, a hormone that triggers uterine contractions. It is also reported that administering massage for 20 minutes each hour during the labor process can help reduce pain. Massage therapy has a positive impact on mothers in labor by lowering stress hormones, decreasing excessive fetal activity, alleviating leg and back pain, and reducing the risk of obstetric complications, while ensuring that newborns remain in good condition.

In addition, massage increases serotonin levels, which in turn lowers cortisol and reduces the risk of depression [15]. Serotonin also contributes to relieving leg and back pain, enhancing dopamine, and ultimately decreasing norepinephrine and anxiety. Endorphins, often referred to as the "happiness hormones," are morphine-like substances naturally produced by the body through the pituitary gland and central nervous system. They play a crucial role in relieving pain and discomfort. The term *endorphin* is derived from "endogenous morphine," meaning morphine that originates naturally from within the body. Once released, endorphins exert effects not only in the brain but throughout the entire body.

The effect of oxytocin massage on pain during the first stage of labor in mothers giving birth

Based on Table 5, the results of the Wilcoxon test for oxytocin massage before and after treatment showed a p-value of 0.004 <0.05, indicating an effect of oxytocin massage on first-stage labor pain in laboring mothers. The mean labor pain score before oxytocin massage was 7.6 and after oxytocin massage was 2.4, with a mean decrease of 5.2.

Oxytocin massage stimulates both sides of the spine to relax tension and anxiety in laboring mothers, resulting in an increased oxytocin reflex.

The benefits of oxytocin massage during labor include improving blood circulation and stretching the muscles, thus reducing pain experienced during labor. It also stimulates the body to release endorphins, which act as pain relievers and can create a feeling of comfort.

Other benefits include reducing stress hormones and increasing oxytocin levels [18]. Comfortable touch supports increased oxytocin levels, which help reduce anxiety [19]. Consistent with Qonitun's (2020) findings, most respondents experienced moderate pain, but after receiving oxytocin massage, this decreased to mild.

Further research by Ekayani (2019) demonstrated that a combination of relaxation techniques and massage significantly influenced labor pain, with a p-value of 0.00, showing a positive effect of back massage in primigravida mothers.

Similarly, Sofia (2020) reported comparable findings, where the Fisher's Exact test produced a p-value of 0.013 (<0.05), confirming that back massage effectively reduced first-stage labor pain among primigravida women.

Researchers suggest that oxytocin massage alleviates labor pain by lowering epinephrine and norepinephrine levels in the blood. Elevated levels of these hormones are associated with heightened anxiety, increased heart rate and blood pressure, and greater blood flow to skeletal muscles. By stimulating the release of oxytocin and endorphins, oxytocin massage promotes balance in brain and body responses, leading to calmness, reduced muscle tension, and relaxation. This sense of relaxation helps minimize fear, prevents excessive adrenaline production, and facilitates the proper secretion of pain-modulating substances, ultimately improving blood flow and oxygen delivery to the uterus, thereby reducing pain.

From the review and analysis, oxytocin massage has been consistently shown to have a beneficial effect in reducing maternal labor pain. Stimulation along the spine, particularly around the 5th–6th ribs, triggers oxytocin release, which enhances physiological uterine contractions and promotes endorphin secretion as the body's natural analgesics. This mechanism not only diminishes pain perception but also supports relaxation and smoother labor progression. Hence, oxytocin massage may be recommended as a safe, simple, and effective non-pharmacological method to relieve labor pain, enhance maternal comfort, and contribute to a more positive childbirth experience.

The effect of endorphin massage on pain during the first stage of labor in mothers giving birth

Based on Table 5, the results of the Wilcoxon test for endorphin massage before and after treatment showed a p-value of 0.003 < 0.05, indicating an effect of oxytocin massage on first-stage labor pain in laboring mothers. The mean labor pain score before endorphin massage was 6.8 and after endorphin massage was 1.9, with a mean decrease of 4.7.

Endorphins are natural hormones produced by the human body, making them excellent pain relievers [13]. Endorphin therapy is believed to produce four key benefits for the body and mind: boosting the immune system, reducing pain, reducing stress, and slowing the aging process.

Endorphin massage has been shown to influence the regulation of growth and sex hormones, alleviate persistent pain and discomfort, reduce stress levels, and enhance immune function. These physiological benefits contribute to its effectiveness in supporting and facilitating the labor process. This is in line with the research findings of Putri et al. (2019), who stated that endorphin massage has an effect on reducing pain levels in laboring mothers.

Research conducted by Meihartati (2018) found that the Wilcoxon alternative test yielded a P-value of 0.003. Research by Arianti (2019) showed a significant difference in pain reduction before and after endorphin massage.

Researchers assume that the effect of endorphin massage on labor pain is due to the body's release of endorphins, pain relievers that can promote a feeling of comfort during labor, control stress, and boost the immune system. The release of endorphins can improve blood circulation, thus improving the functioning of

the uterine blood system, reducing pain experienced by the mother due to the increased supply of oxygen to the uterus.

As a non-drug intervention, endorphin massage stimulates endorphin release through soft, rhythmic touch, providing natural pain relief. The massage is generally applied to areas such as the lower back, shoulders, neck, and hands, creating a calming effect and reducing muscle tension. During labor, the increase in endorphin levels helps block pain signals to the brain, thereby decreasing the perception of pain and promoting a sense of comfort and relaxation. This physiological response can also reduce anxiety, stabilize breathing, and enhance the mother's overall coping ability throughout the childbirth process.

Research and clinical practice have shown that endorphin massage is a safe and effective complementary method for managing labor pain. Its ease of application, absence of pharmacological side effects, and ability to involve the partner or family as a support person make it an appealing option in maternity care. By integrating endorphin massage into labor management, healthcare providers can offer mothers a more holistic birthing experience—one that minimizes discomfort, fosters emotional well-being, and supports the smooth progression of labor.

ADVANCED RESEARCH

Future research is expected to directly compare the effectiveness of oxytocin massage and endorphin massage in reducing labor pain, both in the latent and active phases of the first stage of labor. Researchers are advised to use an experimental study design with a larger and more diverse sample size, so that the results can be generalized to a wider population. Furthermore, pain measurement should be complemented with objective and subjective instruments, and consider other factors that may influence pain perception, such as anxiety levels, family support, and previous labor experiences. Further research could also explore the combined effects of both massage techniques on pain reduction and labor duration, thereby providing more comprehensive recommendations for midwifery practice.

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