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# Analysis of endorphin massage and deep breathing relaxation on reducing back pain in pregnant women

**Retno Palupi Yonni Siwi[1], Erma Retnaningtyas[2], Anggrawati Wulandari[3], Musabbiha Dg. Masiga[4]**

[1,2,3,4]Department of Midwifery, Faculty of Midwifery, STRADA Universitas Indonesia, Indonesia

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**ABSTRACT**

One of the physiological problems that pregnant women often complain about is back pain. Lack of treatment by pregnant women in overcoming back pain causes mothers to feel anxious and worried. The purpose of this study was to determine the effect of endorphin massage and deep breathing relaxation on reducing back pain in pregnant women. This study design was pre-experimental, with a two-group pretest-posttest approach. Respondents were taken using a purposive sampling technique with a sample of 30 respondents. The independent variables were endorphin massage and deep breathing relaxation and the dependent variable was the reduction in back pain. The results of the statistical test used an independent t-test. The results showed that before the endorphin massage, most pregnant women experienced severe back pain, as many as 10 respondents (66.6%), and after the endorphin massage, it was known that almost all respondents had no pain, as many as 14 respondents (93.3%). Almost all respondents before the deep breathing relaxation experienced severe pain, as many as 14 respondents (93.3%), and after the deep breathing relaxation, most respondents had no pain, as many as 11 respondents (73.3%). The data analysis results showed a significance level of 0.000 < α = 0.05, so Ho was rejected and H1 was accepted. This means that endorphin massage and deep breathing relaxation have an effect on reducing back pain in pregnant women because they can promote relaxation and minimize the sensation of pain.



***Corresponding Author:***

Retno Palupi Yonni Siwi,
Faculty of Midwifery,
STRADA Universitas Indonesia,
M Jl. Manila No.37, Tosaren, Kec. Pesantren, Kota Kediri, Jawa Timur, 64123, Indonesia
Email: palupi@strada.ac.id

## INTRODUCTION

Pregnancy is a natural process that occurs from conception to the formation of a fetus that grows in the mother's womb. Pregnancy is divided into 3 periods known as trimesters of pregnancy. During pregnancy a mother will experience changes that occur to her, both physical changes and psychological changes. Physical changes that occur in pregnant women will affect several systems in the body, one of which is the musculoskeletal system. The body shape of pregnant women will change gradually as the pregnancy period increases and the weight gain experienced. The increasing period of pregnancy along with the growth of the fetus and the enlargement of the uterus will cause the center of gravity of the pregnant woman's body to be more inclined forward, so the mother needs to adjust her position to maintain balance. As a result, the body will adjust by pulling the back

towards the back so that the lower back is more curved and experiences lordosis and the spinal muscles shorten (Rukmasari et al., n.d.). Back pain is a common complaint experienced by pregnant women in the third trimester. This is caused by the enlarging uterus putting pressure on the muscles and ligaments of the back, causing discomfort (SALSABILA, 2025).

The high prevalence of back pain (reaching 60-80% in Indonesia) requires antenatal care (ANC) services to shift from basic clinical monitoring to a more holistic approach. This includes an increased focus on posture education, integration of routine physical exercise programs (prenatal yoga/pregnancy exercises), and adjustments to the duration and methods of counseling (Angriani & Puspitasari, 2025). Midwives and obstetricians must integrate appropriate body mechanics education to prevent postural compensation due to changes in the center of gravity and weight gain during pregnancy (Malkis, 2024).

The prevalence of back pain in pregnant women is more than 50% in the United States, Canada, Iceland, Turkey, Korea, and Israel. Meanwhile, in non-Scandinavian countries such as North America, Africa, the Middle East, Norway, Hong Kong, and Nigeria, the prevalence is higher, ranging from 21% to 89.9%. An online survey conducted by the University of Ulster in 2016, of 157 pregnant women who completed a questionnaire, 70% had experienced back pain (Ostgaard et al., 1991). The prevalence of back pain during pregnancy in Indonesia was obtained from a previous study, where of 180 pregnant women studied, 47% experienced back pain. Data from the Pasir Putih Health Center, Mentawa Baru District, East Kotawaringin Regency, shows that around 60% of pregnant women in the third trimester complained of low back pain during antenatal visits. This shows the importance of comprehensive obstetric intervention to identify and manage these complaints so they do not develop into more serious complications (Oktri et al., 2024).

Based on the results of a preliminary study, data was obtained that out of 20 pregnant women in trimester II-III, 13 people (65%) experienced back pain, 7 people (35%) of whom did not experience back pain. Pregnant women who experience back pain are due to heavy physical activities during pregnancy such as standing for too long, lifting objects, etc., in addition to the level of stress during pregnancy, namely psychological burdens that cause painful physical tension, this results in pregnant women who experience back pain can interfere with activities in daily activities.

This back pain symptom also occurs because the increased production of the hormone relaxin during pregnancy causes the pelvic joints (the pubic symphysis, sacroiliac, and sacrococcygeal) to relax in preparation for childbirth. This causes tension in the back and thigh muscles. This can increase the risk of pain (Dehghan et al., 2014).

Pain reduction can be achieved through pharmacological and non-pharmacological approaches. Pharmacological therapy, which involves administering painkillers (analgesics) to pregnant women, is recommended by doctors, while non-pharmacological therapy can be performed by healthcare workers or the patient's family, including endorphin massage and deep breathing relaxation (Kurniyati & Marsinova Bakara, 2021). Endorphin massage is a light touch therapy or massage that is particularly important for pregnant women in the period leading up to and after delivery. This massage stimulates the body to release endorphins, which act as pain relievers and create a feeling of well-being (Suryantini & Ma'rifah, 2024).

Endorphins are known to have numerous benefits, including regulating the production of growth and sex hormones, managing persistent pain and aches, and managing feelings of stress. These benefits can be achieved through various activities, such as deep breathing, relaxation, and meditation. The benefits of endorphin massage include aiding relaxation and reducing pain awareness by increasing blood flow to the affected area, stimulating sensory receptors in the skin and underlying brain, transforming the skin, providing a general sense of well-being associated with human closeness, improving local circulation, stimulating endorphin release, and decreasing endogenous catecholamine stimulation of efferent fibers, which results in blocking pain stimuli (Permata Sari, 2025).

The gaps in previous research regarding the effectiveness of endorphin massage and deep breathing relaxation in pregnant women as such as uncontrolled external variables: factors such as husband/family social support, birth history, fitness level, and cultural background are often not strictly controlled, even though these factors influence pain perception. Lack of objective physiological measures: evaluation of intervention success often relies solely on subjective pain scales (such as VAS or NRS) or the Hamilton anxiety scale, without support from objective biomarkers such as decreased levels of the stress hormone cortisol or increased endorphins. Short monitoring period: assessment of effectiveness is generally conducted immediately after the intervention is delivered. Studies rarely evaluate the long-term impact on the overall labor process or its influence on postpartum outcomes. sample size limitations: Many published studies have small sample sizes and are conducted in specific regions or health facilities, which limits the generalizability of findings to the broader population.

Based on these issues, researchers are interested in examining the analysis of endorphin massage and deep breathing relaxation on reducing back pain in pregnant women.

## RESEARCH METHOD

This study used a pre-experimental design with a two-group pretest-posttest approach. Respondents were recruited using a purposive sampling technique, with a sample size of 30 participants. The independent variables were endorphin massage and deep breathing relaxation, while the dependent variable was the reduction of back pain in pregnant women. Statistical analysis was performed using an independent t-test. A minimum sample size of 30 respondents is considered sufficient to detect changes in pain intensity because it is based on the Central Limit Theorem and empirical statistical rules, where 30 respondents are the distribution of the sample average data starting to approach a normal curve, so that parametric statistical tests can be carried out accurately.

The data collection procedure first sought potential respondents' consent to participate in the study. Second, the researcher administered the Numerical Rate Scale (NRS) questionnaire to respondents to assess back pain in pregnant women before treatment. Third, the researcher administered endorphin massage and deep breathing relaxation to pregnant women for five days. Sixth, the researcher administered the NRS questionnaire again to respondents to assess back pain in pregnant women after treatment. Finally, the researcher collected the questionnaires for data processing and analysis. This study has also received ethical approval under the number 000957/EC/KEPK/I/03/2024.

## RESULTS AND DISCUSSIONS

### Results

Table 1. Characteristics of respondent based on age, education, occupation

| Characteristics of Respondents | Amount | Percentage (%) |
|---|---|---|
| Age of Pregnant Mother | | |
| <20 | 7 | 23 |
| 20-35 | 19 | 64 |
| >35 | 4 | 13 |
| Education | | |
| Elementary High School | 6 | 20 |
| Junior High School | 10 | 33 |
| High School | 14 | 47 |
| Occupation | | |
| Housewife | 9 | 30 |
| Self-employed | 15 | 50 |
| Private employee | 6 | 20 |
| Parity | | |
| Primigravida | 9 | 30 |
| Multigravida | 18 | 60 |
| Grandemultigravida | 3 | 10 |

Based on table 1, it shows that the majority of respondents are aged 20-35 years, as many as 19 (64%) respondents, almost half of the respondents have a high school education, as many as 14 (47%) respondents, half of the respondents work as self-employed, as many as 15 (50%) respondents, the majority of respondents were multigravida, as many as 18 (60%) respondents.

Table 2. Back pain in pregnant women before and after endorphin massage

| Intensity of Back Pain in Pregnant Women | Endorphin massage | | | |
|---|---|---|---|---|
| | Before | | After | |
| | n | % | n | % |
| No Pain | 0 | 0 | 14 | 93.3 |
| Mild Pain | 1 | 6.7 | 1 | 6.7 |
| Moderate Pain | 3 | 20 | 0 | 0 |
| Severe Pain | 10 | 66.6 | 0 | 0 |
| Very Severe Pain | 1 | 6.7 | 0 | 0 |

Based on table 2, it shows that most of the respondents before giving endorphin massage, the back pain of pregnant women was in the severe pain category, namely 10 respondents (66.6%), and after giving endorphin massage, the back pain of pregnant women was not painful, namely 14 respondents (93.3%).

Table 3. Back pain in pregnant women before and after deep breathing relaxation

| Intensity of Back Pain in Pregnant Women | Deep breathing relaxation | | | |
|---|---|---|---|---|
| | Before | | After | |
| | n | % | n | % |
| No Pain | 0 | 0 | 11 | 73.3 |
| Mild Pain | 0 | 0 | 4 | 26.7 |
| Moderate Pain | 0 | 0 | 0 | 0 |
| Severe Pain | 14 | 93.3 | 0 | 0 |
| Very Severe Pain | 1 | 6.7 | 0 | 0 |

Based on table 3, it shows that almost all respondents before giving deep breathing relaxation for pregnant women had severe back pain, namely 14 respondents (93.3%) and the majority of respondents after giving deep breathing relaxation for pregnant women had no pain, namely 11 respondents (73.3%).

Table 4. Statistical test results of back pain in pregnant women before and after endorphin massage paired samples test

| | | Paired Differences | | | | | t | df | Sig.(2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std.Deviation | Std.Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pain_beforeMassageEndhorphin - Pain_afterMassageEndhorphin | 2.667 | .617 | .159 | 2.325 | 3.008 | 16.733 | 14 | .000 |

Based on table 4, it shows that the results of data analysis using the Paired Sample T-Test statistical test show that the significance level is 0.000 <α = 0.05 so that Ho is rejected and H1 is accepted, thus there is an effect of endorphin massage on reducing back pain in pregnant women.

Table 5. Statistical test results of back pain in pregnant women before and after deep breathing relaxation paired samples test

| | | Paired Differences | | | | t | df | Sig.(2-tailed) |
|---|---|---|---|---|---|---|---|---|
| | | Mean | Std.Deviation | Std.Error Mean | 95% Confidence Interval of the Difference | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lowr | Uppr | | | |
| | Pair 1 Pain_beforerelaxation asinafasdalam Pain_after_deep_breath_relaxation | 2.80 0 | .561 | .145 | 2.490 | 3.110 | 19.344 | 14 | .000 |

Based on table 5, it shows that the results of data analysis using the Paired Sample T Test statistical test show that the significance level is 0.000 <α = 0.05 so that Ho is rejected and H1 is accepted, thus there is an effect of providing deep breathing relaxation on reducing back pain in pregnant women.

The success of endorphin massage and deep breathing relaxation in reducing back pain and increasing the comfort of pregnant women lies in their ability to break the pain cycle, reduce stress hormones, and stimulate the production of the body's natural pain relievers.

**Discussion**

**Back pain in pregnant women before and after endorphin massage**

Most of the respondents before giving endorphin massage, the back pain of pregnant women was in the severe pain category, namely 10 respondents (66.6%), and after giving endorphin massage, the back pain of pregnant women was not painful, namely 14 respondents (93.3%). This shows that pregnant women experience back pain in the severe category due to a lack of knowledge and information about non-pharmacological therapies such as endorphin massage in treating back pain during pregnancy.

Maternal age and parity are among the factors influencing response to endorphin massage. Age influences a person's perception of pain. Younger respondents may have different levels of anxiety or tension in response to pain than older respondents, who tend to be more psychologically mature and adaptive. In the context of childbirth or other pain experiences, multiparous mothers (those who have given birth before) often respond to relaxation techniques more quickly than primiparous mothers because they have a better understanding of pain sensations and the necessary adaptations (Silah Naution et al., 2021).

The results of this study are supported by (Dewanti et al., 2024), in her research journal, which shows that most respondents felt moderate back pain on a scale of 4 to 6 before endorphin massage, namely 17 respondents (77.3%) and severe back pain as many as 5 respondents (22.7%). That the three clients were given endorphin massage therapy for 30 minutes before endorphin massage. The client's pain scale was measured using a numeric rating scale. The results showed that in the first patient, the pain scale was 5, pain during activity, soreness like being gripped, back pain, and felt continuously (Astuti et al., 2022). Based on observational results, endorphin massage can reduce back pain in pregnant women in the third trimester, ranging from a scale of 6 to a scale of 2. It can be concluded that after applying endorphin massage to reduce back pain, the back pain in pregnant women decreased. Results from visits over five days showed a decrease in the mothers' pain scale. Before the endorphin massage, the pain scale for pregnant women was 6, while after the endorphin massage, the pain scale for pregnant women was 2 (Amareta, 2023).

Based on research results, pregnant women experience mild back pain because the mother does not do activities that require a lot of energy. Mild pain if the pain comes suddenly, moderate pain if the pain comes and feels sore, while severe pain if the pain comes in a hissing manner, is difficult to move until you groan in pain. Back pain that is not treated properly can cause the quality of life of pregnant women to get worse. This problem will continue in the form of repeated injuries or appear continuously in worse conditions as the pregnancy progresses (Wulandari et al., 2023).

Variations in the intensity of third-trimester back pain in pregnant women before receiving the endorphin massage relaxation intervention, 13 people (86.6%) reported experiencing severe pain, 2 people (13.3%) experienced moderate pain, and none reported mild pain. There was a significant change after the intervention, with all respondents (100%) reporting only mild discomfort and none experiencing moderate or severe pain. These findings suggest that endorphin massage relaxation is

beneficial in reducing the severity of third-trimester back pain in pregnant women, with clear improvements seen after the intervention (Nabila et al., 2025).

Pregnancy with low back pain (LBP) is a common complaint that occurs in pregnant women. This can potentially affect the quality of their lives which will have a negative impact. Factors that influence LBP include mechanical, hormonal and other factors (Puspitasari & Indrianingrum, 2021). Back pain is not promptly addressed, it can lead to prolonged or long-term pain. It can also increase the likelihood of postpartum pain and chronic back pain, which is difficult to treat when the pain spreads to the pelvic area, making it difficult to perform activities such as walking, standing after sitting, or lifting objects (Afifah et al., 2025).

Gentle touch or stroking of the back and neck stimulates the nervous system to release endorphins and serotonin. These hormones act like natural morphine, effectively blocking pain receptors in the brain. A light massage also helps improve blood circulation, relaxes muscles that are tense or stiff due to postural changes during pregnancy, and reduces lower back pain (Lumruan Sihombing et al., 2025). This therapy also reduces the production of the stress hormone cortisol, resulting in a calmer pregnant woman, normal blood pressure and heart rate, improved sleep quality, and consistent and repeated touch that provides a comforting sensation that can distract the brain from the pain (Kurniyati & Bakara, 2020).

Based on the facts and theories explained, researchers conclude that non-pharmacological therapy, one of which is endorphin massage, is necessary to address back pain in pregnant women. The benefits of endorphin massage include, creating relaxation and reducing pain awareness by increasing blood flow to the area that feels pain, stimulating sensory receptors in the skin and the brain underneath, changing the skin, providing a feeling of pleasure associated with closeness between humans, increasing local circulation, stimulating the release of endorphins, reducing endogenous catecholamines, stimulating efferent fibers that block pain stimuli (Dzikrina, 2022).

**Back pain in pregnant women before and after deep breathing relaxation**

Almost all respondents before giving deep breathing relaxation for pregnant women had severe back pain, namely 14 respondents (93.3%) and the majority of respondents after giving deep breathing relaxation for pregnant women had no pain, namely 11 respondents (73.3%).

Based on the research result, pregnant women with advancing gestational age would experience heavier lower back pain compared to the ones with early pregnancy. A more advancing gestational age would increase mother's weight, and as the consequences changes mother and fetus body shape as well as placenta and other aspects. In fact pregnant women weight gain is good for the fetus growth, but in the other hand increase burden in mother's lower back so it causes lower back pain (Susanti & Madhav, 2022).

Back pain during pregnancy is an indication which is often experienced by pregnant women in the beginning of the third trimester. Because the older the fetus and the uterus gets, the morepressure would burdenthe back bone, so most pregnant women experience lower back painin the third trimester. About 50-70 percent of pregnant women experience lower back pain. It can be found in every pregnancy age level, but mostly in the third trimester (Arzeta et al., 2023).

Deep breathing relaxation is one of the relaxation techniques that is often used to reduce pain and reduce pain intensity by stimulating the central nervous system, namely the brain and spine to produce endrophins that function as pain inhibitors. According to Andriana, the deep breath relaxation technique is a form of nursing care, in which case the midwife teaches the client how to perform deep breathing techniques during contractions by using chest breathing through the nose will flow oxygen to the blood, then flow throughout the body. So that the laboring mother will feel relaxed and comfortable because the body will flow the endorphin hormone which is a natural pain reliever in the body (Muldaniyah et al., n.d.).

The average back pain scale in pregnant women in their third trimester after deep breathing relaxation therapy was lower than before. This occurs because when a person achieves relaxation, the perception of pain decreases and anxiety about pain is minimized. Essentially, pain reduction

through relaxation techniques lies in the physiology of the autonomic nervous system, which is part of the peripheral nervous system that maintains homeostasis within an individual. When chemical mediators, such as prostaglandins, are released, they stimulate the sympathetic nervous system, causing vasoconstriction, which increases muscle tone, resulting in various effects, such as increased muscle metabolism, which results in the transmission of pain impulses from the spinal cord to the brain (Amin, 2023).

When someone achieves relaxation, pain perception decreases and anxiety about pain is minimized. Essentially, pain reduction through relaxation techniques lies in the physiology of the autonomic nervous system, which is part of the peripheral nervous system that maintains homeostasis within an individual's internal environment. When chemical mediators such as prostaglandins are released, they stimulate the sympathetic nervous system, causing vasoconstriction, which increases muscle tone, resulting in various effects such as increased muscle metabolism, which leads to the transmission of pain impulses from the spinal cord to the brain. In a relaxed state, the body stops the production of adrenaline and all hormones needed during stress. This is because the sex hormones estrogen and progesterone, as well as the stress hormone adrenaline, are produced from the same chemical building blocks. Reducing stress reduces the production of both sex hormones (Tandondo et al., 2025).

The process of deep breathing relaxation in reducing pain intensity is by relaxing skeletal muscles that experience spasms due to increased prostaglandins, which results in blood vessel dilation and increased blood flow to the spasmodic and ischemic areas. This relaxation therapy can also stimulate the release of endogenous opioids such as endorphins and enkephalins. When the mother performs deep breathing relaxation, the parasympathetic nervous system component is activated, which reduces cortisol and adrenaline levels, affects stress levels, increases concentration, regularizes breathing rhythms, and makes the mother feel calmer (Baljon et al., 2022).

ANC services should facilitate or refer pregnant women to special classes such as Prenatal Yoga or pregnancy exercises, endorphin massage, which have been shown to be effective in reducing third-trimester back pain. Health workers should identify this complaint early to prevent worsening postpartum pain and prevent sleep disturbances or a decrease in the mother's quality of life. Integrated antenatal care should now prioritize assessment of musculoskeletal comfort, including providing non-pharmacological pain management instructions (Malkis, 2024).

Based on the facts and theories explained, researchers believe that to manage pain, pregnant women are advised to control their breathing to less than 60-70 breaths per minute. Providing breathing relaxation for 30 minutes has a significant impact on reducing pain levels. Thus, deep breathing relaxation techniques are considered very beneficial for pregnant women in reducing back pain by relaxing stiff muscles, improving blood circulation, stimulating endorphins or the love hormone, a natural stress reliever and pain reliever.

## CONCLUSION

Before the administration of endorphin massage, back pain in pregnant women was in the severe pain category of 10 respondents (66.6%) and after the administration of endorphin massage, it was known that almost all respondents, 14 respondents (93.3%) were in the no pain category. Meanwhile, back pain before the administration of deep breathing relaxation was known that almost all respondents, 14 respondents (93.3%) were in the severe pain category and after the administration of deep breathing relaxation, it was known that most respondents, 11 respondents (73.3%) were in the no pain category. The results of the data analysis showed that the significance level was 0.000 <α = 0.05 so that Ho was rejected and H1 was accepted, thus there was an effect of endorphin massage and deep breathing relaxation on reducing back pain in pregnant women. It is hoped that health workers will provide information and health education about the effect of endorphin massage and deep breathing relaxation on reducing back pain in pregnant women.

To help pregnant women practice relaxation techniques independently, they should receive structured training through a Prenatal Education Class or through a certified instructor. This training

should combine guided physical exercises, stress psychoeducation, and tailored home routines to build muscle memory and mental confidence for labor. Pregnant women should first attend a hands-on class (led by a physical therapist, midwife, or certified yoga instructor) to learn proper body mechanics, positions, and safe modifications. They should also use guided audio recordings, apps, or home video tutorials to help them become second nature. They should also teach their partner how to assist with techniques such as rhythmic massage, stroking, and encouraging breathing patterns to ensure support during active labor. Pregnant women should consult with their obstetrician or local pelvic floor physical therapist before starting any new exercises, especially if they are experiencing pain or have a high-risk pregnancy.

Further research should aim to measure levels of the stress hormone cortisol or increases in endorphins. Determining the optimal duration, frequency, and technique (e.g., the specific areas of massage most effective during pregnancy) to standardize clinical guidelines. Examining the long-term impact of maternal relaxation on fetal parameters (such as fetal heart rate variability) and postpartum infant outcomes (APGAR scores, crying duration, and behavioral development).

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