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# The Effect of a Combination of *Effleurage Massage* and *Endorphin Massage* on the Back Pain Scale for Third Trimester Pregnant Women at the Padangsari Health Center, Semarang City

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**ABSTRACT**

**Background:** The prevalence of back pain in pregnant women in Indonesia ranges from 60% to 80%. In Central Java, it is 40%, while in Semarang in 2021, it was 73.3%. At the Padangsari Health Center, 9 of 10 mothers who experience back pain only seek relief through rest. This indicates that the incidence of back pain remains high, but there is a lack of effective solutions for managing it. This study to determine the effect of a combination of effleurage massage and endorphin massage on the back pain scale of third trimester pregnant women. **Methods:** This research design is a quasy experiment with a non-equivalent control group design. Participants were divided into two groups: the experimental group received a combination of effleurage massage and endorphin massage, while the control group practiced deep breathing relaxation techniques. The research was conducted at the Padangsari Health Center from January 7th to 13th, 2023. A total of 30 pregnant women experiencing back pain (15 in each group) were selected as the sample size, determined using the Lemeshow formula and purposive sampling technique. The Numeric Rating Scale (NRS) pain scale observation sheet was used as the research instrument. Data analysis included univariate and bivariate methods. Univariate analysis involved calculating frequency distributions, while bivariate analysis used the Wilcoxon test for non-normally distributed data and the dependent t-test for normally distributed data. The Mann-Whitney test was employed to assess differences in back pain between the two groups. **Results:** The results of univariate analysis showed that most of the respondents were 20-35 years old in the experimental group (80.0%), primipara (53.3%), 33-37 weeks of gestation (46.7%), housewife (73.3%). In the control group, most of the respondents were 20-35 years old (86.7%), primiparous (60.0%), 28-32 weeks gestational age (80%), housewife (53.3%). The result of bivariate analysis with Mann-Whitney test showed a significant difference in the reduction of back pain scale between the experimental group and the control group, with a p-value of 0.000. **Discussion:** The combination of effleurage massage and endorphin massage effectively reduces the scale of back pain in third-trimester pregnant women at the Padangsari Health Center in Semarang city. There is a significant difference in the back pain scale between pregnant women who received a combination of effleurage massage and endorphin massage and those who used deep breathing relaxation techniques. The suggestion is a combination of effleurage massage, and endorphin massage can be used to reduce back pain in third trimester pregnant women.

**Keywords**: Back Pain, A Combination Of Effleurage Massage And Endorphin Massage

**INTRODUCTION**

During the pregnancy period, pregnant women often experience discomfort, particularly in the third trimester. Common discomforts include frequent urination, constipation, sleep disturbances, and back pain. Back pain, specifically in the lumbar sacral area, tends to increase as the gestational age progresses due to shifts in the center of gravity and changes in the posture of pregnant women (Kelly, 2013). Pain is one of the most common problems faced by pregnant women in the third trimester. It can generate feelings of fear and anxiety, which in turn can increase stress levels and have a significant impact on a person's physiology during pregnancy. Fear and pain interact negatively, exacerbating each other (Purnamasari, 2019). Back pain in pregnant women is caused by joint instability resulting from flexible ligaments, disruptions in spinal curvature, stretched abdominal muscles, increased maternal weight, and poor posture (Barus et al., 2018).

Research conducted in Malawi in 2018 indicated that the prevalence of back pain in pregnant women reached 62% (Manyozo et al., 2019). Similarly, a study in Canada in 2018 found that the prevalence of back pain in pregnant women was 76.6% (Weis et al., 2018). According to research conducted by Apriliyani Mafikasari and Ratih Indah Kartikasari in 2015, 60-80% of pregnant women in Indonesia experience back pain. In Central Java, the percentage of pregnant women with low back pain is 40% (in (Wulandari & Andryani, 2019). A study conducted in Semarang in 2021 reported that approximately 73.33% of pregnant women suffer from moderate back pain, 10% experience mild pain, and around 16.67% have severe pain (Purnamasari, 2019). The severity of back pain in pregnant women can be influenced by factors such as gestational age, parity, age, activity, and body relaxation (Arummega et al., 2022).

Back pain significantly affects the well-being of both the mother and the fetus. It disrupts daily activities, reduces the quality of life, hampers maternal activity and productivity (Khan et al., 2017). Maternal activity plays a crucial role in cervical ripening before delivery, reducing the risk of prolonged labor, and minimizing medical interventions during childbirth, such as amniotomy, labor induction, and cesarean section (Rahmawati, 2019). Additionally, back pain can negatively impact the quality of sleep for pregnant women, making them feel uncomfortable (Renityas et al., 2017). A study conducted in Brazil in 2015 also demonstrated that pregnant women with back pain experience poorer sleep quality compared to those without pain (Sousa et al., 2015).

Although back pain in the third trimester of pregnancy is a physiological problem, providing comfort to mothers during this period is essential. There are two main methods for relieving pain: pharmacological methods (using drugs) and non-pharmacological methods (such as massage, acupuncture, relaxation, hydrotherapy, hypnosis, and music). Non-pharmacological methods can help mothers relax and manage pain in a controlled manner. (Nuraini et al., 2019). Massage therapy is one of the non-pharmacological treatments used to alleviate back pain in pregnant women, relax tense muscles, relieve pain, improve mobility, and enhance blood circulation (Hartati, Walin, 2015). Effleurage massage, a gentle and

continuous rubbing technique, has a relaxing effect (Aini, L, 2016). The effleurage massage technique has a relaxing and calming effect, thereby improving the psychological condition of the mother (Rahayu et al., 2020). Improved psychological conditions can affect perceptions of pain (Saulata et al., 2019).

In addition to effleurage massage, endorphin massage can reduce back pain during the third trimester of pregnancy. Endorphin massage can induce the production of endorphins in the body as painkillers and provide comfort (Darmawan & Waslia, 2019). Endorphin massage can stimulate sensory receptors in the skin and the brain, trigger the release of endorphins, reduce endogenous catecholamines, and provide stimulation when efferents block pain stimuli (Aprilia, 2017). Endorphin massage performed by husbands for postpartum mothers makes a significant contribution to reducing anxiety and increasing the mother's self-confidence (Rahayu et al., 2018).

Based on research conducted in 2019, providing effleurage massage techniques can reduce the back pain scale in the third trimester of pregnancy (Setiawati, 2019). Research conducted in 2020 using the NRS (Numeric Rating Scale) revealed that 45% of pregnant women suffered from severe back pain before receiving an endorphin massage, and 0% after getting an endorphin massage, indicating a relationship between endorphin massage and back pain intensity (Handayany et al., 2020).

Research on effleurage massage has been done before, such as the research in Pekanbaru in 2022, but the research method used a pre-experimental design with a pre-test and post-test design, without a control group (Wati et al., 2022). The research shows that giving effleurage massage alone resulted in a decrease in pain, with a median difference in pain levels of only 2 points (Suryani et al., 2022). Research on endorphin massage has also been conducted before, but the method used was the Pre-Experimental design, without a control group. The results obtained in this study showed that the difference between the mean pain scale before and after giving effleurage massage was only 0.84 points (Kurniyati & Bakara, 2021). Previous research suggested that effleurage massage and endorphin massage can reduce back pain in third trimester pregnant women, but only using one massage. No research has been conducted combining the two types of massage to reduce back pain in third trimester pregnant women.

Based on the results of a preliminary study at the Padangsari Health Center, data were obtained from 10 third trimester pregnant women who were interviewed, 9 of whom had complaints of back pain. Most mothers deal with back pain simply by resting or lying down. This shows that many pregnant women still complain of back pain, but solutions to overcome the problem of back pain in pregnant women are still lacking.

Based on this background, the purpose of this research is to examine "The effect of a combination of effleurage massage and endorphin massage on the back pain of third trimester pregnant women at the Padangsari Health Center.

## METHOD

This research design is a quasy experiment with a non-equivalent control group

design. The population in this study were third trimester pregnant women who experienced back pain and checked their pregnancy at Padangsari Health Center. Sampling in this study used non-random sampling technique purposive sampling technique. In this study, researchers collected samples from pregnant women's classes, pregnant women who did antenatal care at Padangsari Health Center, and home visits of third trimester pregnant women with midwife assistance.

This research has received ethical clearance from the Research Ethics Commission of Poltekkes Kemenkes Semarang with protocol no. 0786/EA/KEPK/2022, dated 19th December 2022. The researcher obtained informed consent from the respondents, explained the research objectives, and administered a pre-test before data collection. Following the intervention, which included a combination of effleurage massage, endorphin massage, and deep breathing relaxation techniques, the respondents filled out a post-test.

The sample size in this study consisted of 15 pregnant women in each group, resulting in a total of 30 samples after using the Lemeshow formula to calculate the sample size. The inclusion criteria were pregnant women aged ≥ 28 weeks, experiencing back pain complaints, and willing to participate as respondents. The exclusion criteria were pregnant women taking pain relievers, suffering from hypertension (blood pressure ≥ 140/90 mmHg), preeclampsia, having a body temperature > 38°C, experiencing pathological back pain, having skin diseases (pus, boils), or having wounds in the back area. Purposive sampling was employed as the sampling technique.

The instrument used in this study was the Numeric Rating Scale (NRS) pain scale observation sheet, which was used to assess the pain levels in the pre-test and post-test. In the experimental group, the respondents received a 20 minute combination of effleurage massage and endorphin massage administered by researchers and enumerators, while the control group received 10 minutes of deep breathing relaxation techniques.

Before conducting the data analysis, the Shapiro-Wilk test for data normality was performed due to the sample size being less than 50. The statistical tests employed were as follows: to measure the difference in mean pre-test and post-test scores in the experimental group, the Wilcoxon test was used, assuming a not normal data distribution. To measure the differences in pre-test and post-test scores in the control group, the dependent t-test was used, assuming a normal data distribution. Finally, to assess the difference in pain scale changes between the two groups, the Mann-Whitney test was used, considering the data distribution was not normal.

**RESULTS**

The frequency distribution of the respondents' age, parity, gestational age, and occupation is presented in the following table.

**Tabel 1.** The frequency distribution of the characteristics of the respondents' age, parity, gestational age, and occupation is as follows

| Characteristic | Experiment Group | | Control Group | |
|---|---|---|---|---|
| | Frequency | Percentage (%) | Frequency | Percentage (%) |
| **Age** | | | | |
| <20 years old | 1 | 6,7 | 0 | 0 |
| 20-35 years old | 12 | 80,0 | 13 | 86,7 |
| >35 years old | 2 | 13,3 | 2 | 13,3 |
| Total | 15 | 100 | 15 | 100 |
| **Parity** | | | | |
| Primipara | 8 | 53,3 | 9 | 60,0 |
| Multipara | 7 | 46,7 | 6 | 40,0 |
| Total | 15 | 100 | 15 | 100 |
| **Gestational age** | | | | |
| 28-32 weeks | 5 | 33,3 | 12 | 80,0 |
| 33-37 weeks | 7 | 46,7 | 2 | 13,3 |
| 38-42 weeks | 3 | 20,0 | 1 | 6,7 |
| Total | 15 | 100 | 15 | 100 |
| **Occupation** | | | | |
| Housewife | 11 | 73,3 | 8 | 53,3 |
| Teacher | 0 | 0 | 0 | 0 |
| Trader | 0 | 0 | 0 | 0 |
| Private | 4 | 26,7 | 5 | 33,4 |

| | | | | |
|---|---|---|---|---|
| Civil servant | 0 | 0 | 2 | 13,3 |
| Total | 15 | 100 | 15 | 100 |

Based on the characteristics of the respondents presented in Table 1, it can be observed that the majority of respondents in the experimental group were aged 20-35 years (80.0%), primiparas (53.3%), with a gestational age of 33-37 weeks (46.7%), and occupied as housewives (73.3%). In the control group, the majority of respondents were also aged 20-35 years (86.7%), primiparas (60.0%), with a gestational age of 28-32 weeks (80%), and occupied as housewives (53.3%)

**Table 2.** The differences in back pain scales between the pre-test and post-test in the experimental group are as follows:

| Back Pain Scale | N | Mean±SD | Min – Max | *P value* |
|---|---|---|---|---|
| Pre-test | 15 | 4,53±0,834 | 3 – 6 | 0,000* |
| Post-test | 15 | 2,27±1,100 | 1 – 5 | |

* = Wilcoxon test

Based on Table 2, it shows that the pre-test back pain scale in the experimental group had a mean ± SD of 4.53 ± 0.834, with a minimum pain scale of 3 and a maximum pain scale of 6. The post-test back pain scale in the experimental group had a mean ± SD of 2.27 ± 1.100, with a minimum pain scale of 1, a maximum pain scale of 5, and a p-value of 0.000. Therefore, it can be concluded that there are significant differences in the pre-test and post-test back pain scales in the experimental group that received the combination treatment of effleurage massage and endorphin massage

**Table 3.** The differences in back pain scales between the pre-test and post-test in the control group are as follows:

| Back Pain Scale | N | Mean±SD | Min – Max | *P value* |
|---|---|---|---|---|
| Pre test | 15 | 4,13±1,125 | 2 – 6 | 0,001* |
| Post test | 15 | 3,60±0,986 | 2 – 5 | |

* = Dependent t test

Based on table 3, it shows that the pre-test back pain scale in the control group has a mean ± SD = 4.13 ± 1.125, the minimum pain scale is 2, and the maximum pain scale is 6. The

post-test back pain scale in the control group has a mean ± SD = 3. 60 ± 0.986, minimum pain scale is 2, maximum pain scale is 5, and p value is 0.001. So it can be concluded that there are differences in the pre-test and post-test back pain scales in the control group which was given deep breathing relaxation treatment

**Table 4.** Differences in pain scale differences in the experimental group and the control group

| Group | N | Mean±SD Δ | Min – Max Δ | *P value* |
|---|---|---|---|---|
| **Eksperimental** | 15 | 2,27±0,594 | 1 – 3 | 0,000 * |
| **Control** | 15 | 0,53±0,516 | 0 – 1 | |

* = Mann whitney test

Based on the information provided in Table 4, it can be observed that the results of the Mann-Whitney test for the effect of a combination of effleurage massage and endorphin massage on the back pain scale of third trimester pregnant women yielded a p-value of 0.000, which is less than or equal to the significance level of 0.05 (α=0.05). Therefore, the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected. Thus, it can be concluded that there is a significant difference between the experimental group and the control group in terms of the back pain scale among third trimester pregnant women

## DISCUSSION

1. Characteristics of age, parity, pregnancy age, and maternal occupation in the experimental and control groups

The results indicated that the majority of respondents were aged between 20 and 35 years. This age range is considered safe and healthy for reproductive purposes. Risks can arise during pregnancy or childbirth if the age is below 20 or exceeds 35 years. Women below the age of 20 may have reproductive organs that are not fully developed, and their emotional and psychological maturity may not be fully established. Similarly, women who become pregnant at the age of over 35 years face an increased risk of pregnancy complications due to age-related changes in the reproductive organs.

It is important to consider these age factors when assessing the potential risks and complications associated with pregnancy and childbirth. Additionally, parity (the number of previous pregnancies), pregnancy age, and maternal occupation are also important characteristics that can influence the outcomes of pregnancy and childbirth (Sukma & Sari, 2020). From the results of this study, it can be concluded that the majority of respondents in both the experimental and control groups were within the safe and optimal age range for pregnancy.

The results showed that in the experimental group and the control group, the respondents were primiparas and multiparas. According to Whalley (2008), primiparous pregnant women will experience greater back

pain because they do not have experience of pain tolerance for pregnant women (Kurniati et al., 2019). In multiparous women, it is observed that the muscles, particularly in grand multiparous women, tend to be weaker compared to primiparous women. As a result, they may have a higher risk of experiencing back pain. This weakening of muscles is attributed to the increasing size of the uterus during subsequent pregnancies. When the muscles are unable to adequately support the growing uterus, it can lead to sagging of the uterus and elongation of the back arch. It is commonly observed that grand multiparous women may experience weakened abdominal muscles. (Fithriyah et al., 2018).

In the experimental group, the majority of respondents had a gestational age of 33-37 weeks, while in the control group, most respondents were at a gestational age of 28-32 weeks. It is well-known that many pregnant women experience low back pain during the third trimester (Purnamasari, 2019). During this stage of pregnancy, the severity of lordosis (excessive inward curvature of the spine) and pain tends to increase(Glinkowski et al., 2016). As the gestational age advances, the growing size of the uterus affects the posture of pregnant women. The additional weight of the uterus puts strain on the back, resulting in discomfort and pain (Diana, 2019).

Most of the respondents were housewives in both the experimental group and the control group. Pregnant women who work as housewives experience back pain because they are involved in several activities (Fitriana & Vidayanti, 2019). The work of housewives can include ironing, preparing food, and sweeping, which are done in a long-standing position and can cause tension in the pelvic muscles. Many of these activities can lead to fatigue, lack of rest, and various types of back pain (Dentiana 2008 in (Handayany et al., 2020).

2. Differences in the pre-test and post-test back pain scales in the experimental group

Based on the results of the study, there was a significant difference between the pre-test and post-test of the experimental group.

The massage technique known as effleurage massage involves using the palms of the hands to massage the body's surface and reduce pain (Wulandari & Andryani, 2019). Endorphin massage is a light touch technique used to reduce pain. This is because massage will trigger the body to release endorphins to reduce pain, create a feeling of comfort, stimulate sensory receptors in the skin and brain, release endorphins and block pain (Handayani et al., 2021). Giving massage or stimulating the skin triggers the large diameter beta A nerves in pregnant women, which inhibits the transmission of pain signals from the small diameter delta A and C receptors in the Substantia Gelatinosa (SG) to the brain. As a result, the mother's perception of pain decreases. This concept is consistent with the "gate control theory" proposed by Melzack and Wall in 1959 (Zakiyah, 2015).

Decreased back pain can be influenced by the age of the respondent. In the experimental group, the average respondent was 20-35 years old, which means that this age is still in a healthy reproductive period. Besides that it can also be influenced by parity. Some respondents are primigravida pregnant women, primigravida have very good abdominal muscles because the muscles have never experienced stretching before (Amir et al., 2022).

The results of this study are consistent with research conducted in 2022, which found that the level of back pain in pregnant women before undergoing effleurage massage was an average of 2.56. After undergoing effleurage massage, the level of back pain decreased to an average of 1.87. This indicates a decrease in the average level of back pain for pregnant women before and after effleurage massage treatment by 0.69, with a p-value of 0.021 (Mardiani & Resna, 2022). In accordance with research conducted in 2021 that before an endorphin massage the average lower back pain was 2.06, after an endorphin massage the average lower back pain was 1.22, and a p value of 0.001. This means that there is an effect of endorphin massage on reducing lower back pain (Kurniyati & Bakara, 2021).

This research, along with previous studies, suggests that there is a decrease in the pain scale among pregnant women. However, this particular study demonstrates that the mean reduction in the pain scale is greater in the experimental group that received a combination of effleurage massage and endorphin massage compared to previous studies that focused solely on effleurage massage or endorphin massage.

3. Differences in the pre-test and post-test back pain scales in the control group

The results showed that there was a decrease in the scale of back pain in third trimester pregnant women. This decrease in back pain scale is because when deep breathing relaxation is carried out, there is a decrease in the hormone adrenaline in the blood so that the respondent will feel calm and able to regulate breathing patterns easily, finally regular breathing will increase oxygen in the blood and decrease blood pressure so that the respondent feels there is pain reduction (Mauliddiya, 2019). Engaging in deep breathing relaxation techniques allows mothers to control pain, reduce anxiety, promote blood flow to the uterus, and alleviate muscle tension (Yuliantun 2008 in (Yelni, 2022). This result is in agreement with other studies. Deep breathing relaxation techniques affect the pain scale of sufferers of low back pain (Saidi & Andrianti, 2021). The research results are also in line with the research conducted by Sari et. al (2023) there is an effect of deep breathing relaxation techniques on reducing active phase 1 labor pain (Sari et al., 2023).

4. The effect of combination of effleurage massage and endorphin massage on the back pain scale for third trimester pregnant women

Based on the main findings of this study, it was observed that the experimental group, which received a combination of effleurage massage and endorphin massage, exhibited a mean delta of 2.27, which was significantly greater than the mean delta of 0.53 observed in the control group utilizing deep breathing relaxation techniques. These results indicate that there is a statistically significant difference between the experimental group and the control group, with the experimental group demonstrating a more effective reduction in the pain scale compared to the control group.

The difference in the reduction of the pain scale between these two groups can be attributed to variances in pain inhibition pathways. The experimental group experienced a decrease in the back pain scale, which can be

attributed to the effects of massage on the nerves and the cardiovascular system. Massage techniques aim to stimulate relaxation and induce a state of rest throughout the body. This, in turn, contributes to the inhibition of pain pathways and ultimately leads to a reduction in the perceived level of pain. (Wulan et al., 2017). The mechanism of pain reduction during massage involves the stimulation of large-diameter beta A nerves in pregnant women. This stimulation leads to the activation of inhibitory pathways in the spinal cord, specifically in the Substantia Gelatinosa (SG). As a result, the small-diameter delta A and C receptors in the SG become blocked and are unable to transmit pain signals to the brain. This blockade of pain transmission contributes to a decrease in the sensation of pain for the mother. (Zakiyah, 2015). In the control group that received deep breathing relaxation techniques, a decrease in the back pain scale was also observed. Deep breathing relaxation techniques primarily focus on regulating and optimizing the breathing process. By practicing deep breathing, individuals aim to achieve a relaxed state where the nervous system, body, and five senses are at rest, thereby reducing tension. During deep breathing, the intake of oxygen increases, promoting a smooth flow of oxygen throughout the body. This oxygenation process contributes to a calmer, more stable, and comfortable state. By facilitating proper oxygen flow, deep breathing relaxation techniques help in reducing pain and promoting overall relaxation in the body.(Astuti & Bangsawan, 2019).

Based on the findings of the study, it can be concluded that the combination of effleurage massage and endorphin massage has an effect on reducing the back pain scale in third-trimester pregnant women. The results indicate that this combination treatment is more effective in reducing the back pain scale compared to the deep breathing relaxation treatment. Therefore, the combination of effleurage massage and endorphin massage can be considered as a viable alternative for reducing the back pain scale in third-trimester pregnant women.

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**CONCLUSION(S)**

The mean delta pain scale in the experimental group which was given a combination of effleurage massage and endorphin massage was 2.27, which was greater than the mean delta of 0.53 in the control group which was given a deep breathing relaxation technique. There is an effect of a combination of effleurage massage and endorphin massage on the back pain scale of third trimester pregnant women at the Padangsari Health Center, Semarang City with a p value of 0.000.

The suggestion is a combination of effleurage massage and endorphin massage can be used to reduce back pain in third trimester pregnant women. Suggestions for future researchers to control confounding factors such as gestational age, age, parity, daily activities, and body relaxation, and can use true experiment research designs and randomized data collection techniques.

**Conflict of Interest**

The author(s) declare that they have no conflict of interest.

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