The Effect of Prenatal Exercise and Effleurage Massage Techniques on the Perception of Back Pain in Third Trimester Pregnant Women

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Abstract: The perception of back pain is a common discomfort experienced by women in the third trimester of pregnancy. This pain occurs due to the release of the hormones progesterone and relaxin, which loosen the pelvic ligaments, and due to changes in body posture adapting to fetal development. The aim of this study is to analyze the effect of reducing pain before and after implementing prenatal exercises and effleurage massage in third-trimester pregnant women. This research used a quasi-experimental design with only one experimental group and no control group. The study population consisted of all third-trimester pregnant women experiencing back pain, with sampling conducted using accidental sampling. Data was collected using questionnaires and analyzed with the SPSS program, employing both univariate and bivariate tests. The results of the Paired Sample T-Test showed a significant difference between the pre-test and post-test values, with a significance value (2-tailed) of $p = 0.000$, < 0.05. The null hypothesis (H0) was rejected, and the alternative hypothesis (Ha) was accepted, indicating a notable difference between the effects of prenatal exercise and effleurage massage before and after treatment in 180 third-trimester pregnant. There is a significant impact of prenatal exercise and effleurage massage on reducing back pain.

Keywords: Back pain perception; Massage effleurage; Prenatal exercise

Introduction

In 2020, every two minutes of every day nearly 800 women died from preventable causes related to pregnancy and childbirth. Maternal Mortality Rate (MMR) fell by around 34% worldwide. Nearly 95% of all maternal deaths occurred in low and lower middle income countries in 2020 (WHO, 2024). Based on data from Maternal Perinatal Death Notification (MPDN), the Ministry of Health's maternal death recording system, the number of maternal deaths in 2022 will reach 4,005 and in 2023 it will increase to 4,129. Meanwhile, infant deaths in 2022 will be 20,882 and in 2023 it will be recorded at 29,945 (Kemenkes RI, 2024). Until now, the Maternal Mortality Rate (MMR is still in the range of 305 per 100,000 Live Births, has not yet reached the specified

target of 183 per 100,000 KH in 2024. Likewise, we still have to save babies and toddlers from death (Kemenkes RI, 2023). These maternal and infant deaths can be prevented with adequate cooperation across all sectors (Elizar et al., 2022; Almanika et al., 2022; Palifiana & Wulandari, 2018). For example, the Indonesian Ministry of Health stipulates that maternal examinations during gestation or antenatal care (ANC) be carried out at least 6 times over 9 months as a form of commitment to providing essential services for pregnant women (Dina, 2018). gestation. To support this activity, the Ministry of Health is in the process of providing ultrasound in all provinces in Indonesia. Previously, ultrasound examinations could only be carried out in hospitals or clinics, currently mothers during gestation can undergo examinations at Community Health Centers (Kemenkes RI, 2023).

Pregnancy is a unique and complex biological process, which induces coordinated responses from multiple organ systems to accommodate the mother and fetus. The entire pregnancy process starts from conception or fertilization to birth, with an average time of around 266-270 days, or 37-42 weeks or around nine months. During the pregnancy process, changes occur that are usually interrelated in all body systems. These changes are physiological adaptations that can take place gradually and continuously throughout pregnancy (Amanupunnyo et al., 2024). Changes and adaptations of the body's systems to pregnancy can take the form of mechanical adaptations to pregnancy and changes influenced by hormonal factors. The changes that occur in the mother during pregnancy sometimes cause discomfort for the mother, but are often normal changes that allow the mother to adapt to pregnancy, protect the fetus, provide adequate nutrition for the fetus and prepare for childbirth (Soma-Pillay et al., 2016; Almquist et al., 2022 in Amanupunnyo et al., 2024). In general, women during pregnancy are afraid of the birth process because the pain causes fear and anxiety. This can cause mental and physical tension which will result in unnatural stiffness of the muscles and joints (Amphalaza, 2019). This stress or anxiety is related to various pregnancy outcomes, pain and other somatic complaints that often occur with the disorder mood in mothers during gestation (Rusmita & Reginita, 2023; Geta & Demang, 2020).

One of the interventions that can be carried out by mothers during gestation to reduce anxiety and pain is physical exercise, because it has a positive effect on the fetus, gestational age, birth weight and maternal health as well as reducing birth complications such as prolonged labor and reducing pain levels (Rusmita & Reginita, 2023). Antenatal training is exercise therapy in the form of activities or movements given to mothers during gestation to prepare themselves both physically and psychologically to maintain the health of the mother and baby during the gestation period (Widianti, 2010 in Galaupa, 2022). WHO says that physical activities recommended during pregnancy include aerobic activities such as swimming, walking, special exercises for mothers during gestation which are done at least three times a week or 150 minutes per week for moderate intensity (Arummega et al., 2022).

In Indonesia, it is estimated that the rate of lack of physical activity has increased from 26.1 to 33.5% (Kemenkes RI, 2018). Meanwhile, in America, only 32% of women during pregnancy carry out levels of physical activity that meet guidelines during early pregnancy and the number decreases to 12% at the end of pregnancy. Even in China, 80% of mothers during pregnancy do not do enough physical activity until the third trimester. Pangesti et al. (2024) in his research stated that Antenatal Exercise and prenatal yoga were proven to be able to reduce lower back pain in mothers during the third trimester of gestation. Not only that, Antenatal Exercise is also effective in reducing anxiety about facing childbirth.

A preliminary study conducted in January 2024 at the Sobang Community Health Center found that there were 27 mothers during gestation who complained of feeling anxious and in pain or achy (Fasiha et al., 2021). In an appropriate effort to alleviate the anxiety and pain experienced by mothers during gestation, researchers are interested in conducting research on "The Effectiveness of Antenatal Exercise Programs in the Antenatal Period on Reducing Anxiety, Perception of Pain during the Gestation Period at the Sobang Community Health Center".

Method

This research was conducted to determine the effectiveness of Moringa leaves in increasing hemoglobin levels in mothers during gestation at the Teluk Lubuk Community Health Center, Muara Enim Regency in 2024. It was carried out for 3 months from April to June 2024. This research is a research study. Quasy experiment with the group giving dragon fruit. The independent variable in this research is the provision of Moringa leaves, the dependent variable is content Hemoglobin (HB) Mother Gestation period (Arikunto, 2017). The total number of respondents in this study was 60 respondents calculated based on data from mothers during the third trimester of gestation who experienced anemia who were divided into two groups, namely 30 respondents in the group who were given Moringa leaves and 30 respondents in the group who were not given Moringa leaves which were taken by

purposive sampling. Digital Hb meter (Quick check), blood lancet, strip. To increase HB levels, it is best for mothers during gestation to give it (Nuraini & Aminah, 2021). Data analysis was carried out univariately and bivariately, to determine the effectiveness of dragon fruit on the hemoglobin (HB) levels of mothers during gestation who experience anemia using the independent sample t test, if the distribution is normal and if it is not distributed normally, use the Mann-Whitney statistical SPSS version 25 test.
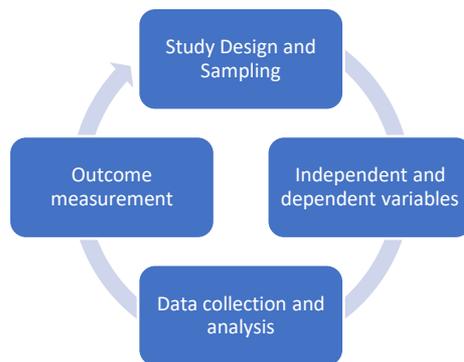

Figure 1. Stages of the research

Result and Discussion

Results
Univariate Data Analysis

Univariate analysis aims to describe the frequency distribution of the characteristics of the research variables using descriptive statistics (Surwondo et al., 2017). The variables analyzed were the mother's level of anxiety, perception of pain, and the birth process during gestation before and after the intervention was given (Tyastuti & Wahyuningsih, 2016; Muawanah, 2023a, 2023b; Fithriyah et al., 2020).

Table 1 results show that respondents in the experimental group aged 20-25 years were 4 respondents (27%), aged 26-30 years were 8 respondents (53%), aged 31-35 years were 2 respondents (13%), and 36-40 years old was 1 person (0.07%). Meanwhile in the control group, there were 4 respondents aged 20-25 years (27%), 5 respondents aged 26-30 years (33%), 5 respondents aged 31-35 years (33%), and 36- 40 years as many as 1 respondent (0.7%). The results show that respondents in the experimental group with employment levels were mostly 11 respondents (73%) as housewives, 3 respondents (20%) worked as private employees and 1 respondent (0.7%) worked as traders. Meanwhile, respondents in the control group, with employment levels mostly as housewives, were 10 respondents (67%), as private employees were 3 respondents (20%), and as traders were 2 respondents (13%). Based on the results, there were 3 respondents in

the experimental group with tertiary education (20%), 5 respondents from junior high school (33%), 7 respondents from high school (47%). Meanwhile, the control group showed that there were 3 respondents with tertiary education (20%) and 3 respondents from junior high school (20%), and 9 respondents from high school (60%).

Table 1. Characteristics of respondents based on age, occupation and education at Sobang Community Health Center in 2024

Variable	F	%
Experimental Group (n = 15)		
Age (years)		
20-25	4	26.7
26-30	8	53.3
31-35	2	13.3
36-40	1	6.7
Work		
Civil servants	0	0
Private Officer	4	26.7
Housewife	7	46.7
Laborer	0	0
Trader	4	26.7
Education		
No School	0	0
Elementary School (SD)	0	0
Junior High School (SMP)	5	33.3
High School (SMA)	7	46.7
College	3	20.0
Control Class (n = 15)	F	%
Age		
20-25	4	26.7
26-30	5	33.3
31-35	5	33.3
36-40	1	6.7
Work		
Civil servants		
Private Officer		
Housewife	4	26.7
Laborer	9	60.0
Trader	2	13.3
Education		
No School		
Elementary School (SD)		
Junior High School (SMP)	3	20.0
High School (SMA)	9	60.0
College	3	20.0

Normality Test Results

Before carrying out the bivariate analysis, a normality test was first carried out on the pretest and posttest measurements of anxiety levels, pain perception, and the labor process before and after the Antenatal Exercise intervention was given to mothers during gestation at the Sobang Community Health Center, on the Anxiety Level variable, based on data analysis using a normality test. Kolmogrove with value p-value > 0.05 means the data is normally distributed.

Normality Test for Maternal Anxiety During Gestation at Sobang Community Health Center

Table 2. Normality test of mother's anxiety level during gestation at Sobang Community Health Center

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Say.	Statistic	Df	Say.
Pre Test Experiment	.233	15	.068	.895	15	.080
Post Test Experiment	.154	15	.200*	.917	15	.175
For Test Control	.142	15	.200*	.950	15	.528
Post test Control	.146	15	.200*	.932	15	.290

Based on Table 2, it can be seen that the sig in the pre-test and post-test of the experimental group as well as the pre-test and post-test in the control group has sig results > 0.05, namely 0.068 in the experimental pre-test, 0.200 in the experimental post-test, 0.200 in the control group pre-test , and 0.200 in the control group post test. This shows the normality of the data so that a test will be carried out using a sample test (Nuraini & Aminah, 2021).

Based on Table 3, it can be seen that the sig in the pre-test and post-test of the experimental group as well as the pre-test and post-test in the control group has a sig < 0.05, namely 0.000 in the experimental pre-test, 0.004

in the experimental post-test, 0.004 in the control group pre-test, and 0.012 in the control group post test. This shows that the data is not normal so it will be tested using a test Mann Whitney.

Table 3. Normality test of maternal pain perception during gestation at Sobang Community Health Center

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Say.	Statistic	Df	Say.
Pre Test Experiment	.324	15	.000	.724	15	.000
Post Test Experiment	.271	15	.004	.798	15	.003
Pre Test Control	.273	15	.004	.814	15	.006
Post Test Control	.250	15	.012	.823	15	.007

Based on Table 4, it can be seen that the sig in the pre-test and post-test of the experimental group as well as the pre-test and post-test in the control group has a sig < 0.05, namely 0.000 in the experimental pre-test, 0.004 in the experimental post-test, 0.004 in the control group pre-test, and 0.012 in the control group post test. This shows that the data is not normal so it will be tested using a test Mann Whitney.

Table 4. Normality test of mother's childbirth process during gestation at Sobang Community Health Center

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Say.	Statistic	Df	Say.
Pre Test Experiment	.324	15	.000	.724	15	.000
Post Test Experiment	.271	15	.004	.798	15	.003
For Test Control	.273	15	.004	.814	15	.006
Post Test Control	.250	15	.012	.823	15	.007

Biverate Data Analysis

Table 5. Effectiveness of antenatal training on maternal anxiety levels during gestation at the Sobang Community Health Center

	Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Say.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.118	.734	-4.800	28	.000	-7.333	1.528	-10.463	-4.204
Equal variances not assumed			-4.800	27.990	.000	-7.333	1.528	-10.463	-4.204

Based on Table 5, it shows that the sig 2. Tailed for the experimental and control groups has a value of < 0.05, so the hypothesis shows that Ha is accepted or that there is effectiveness of Antenatal Training on the

anxiety level of mothers during gestation at the Sobang Community Health Center in 2024.

Table 6. Effectiveness of Antenatal Exercise on Maternal Pain Perception During Gestation at the Sobang Community Health Center

	Pain Perception
Mann-Whitney U	18.000
Wilcoxon W	138.000
WITH	-4.061
Asymp. Sig. (2-tailed)	.000
Exact Sig. [2*(1-tailed Sig.)]	.000b

Based on Table 6, it shows that the Assymp sig. 2 tailed for the experimental and control groups has a value of < 0.05, so the hypothesis shows that Ha is accepted or that there is effectiveness of Antenatal Exercise on mothers' perception of pain during gestation at the Sobang Community Health Center in 2024.

Table 7. Effectiveness of Antenatal Training on the Maternal Childbirth Process During the Gestation Period at the Sobang Community Health Center

	Childbirth Process
Mann-Whitney U	.000
Wilcoxon W	120.000
WITH	-4.715
Asymp. Sig. (2-tailed)	.000
Exact Sig. [2*(1-tailed Sig.)]	.000b

Based on table 7, it shows that the Assymp sig. 2 tailed for the experimental and control groups has a value of < 0.05, so the hypothesis shows that Ha is accepted or that there is effectiveness of Antenatal Training on the birth process of mothers during gestation at the Sobang Community Health Center in 2024.

Discussion
Univariate
Table 1 results show that respondents in the experimental group aged 20-25 years were 4 respondents (27%), aged 26-30 years were 8 respondents (53%), aged 31-35 years were 2 respondents (13%), and 36-40 years old was 1 person (0.07%). Meanwhile in the control group, there were 4 respondents aged 20-25 years (27%), 5 respondents aged 26-30 years (33%), 5 respondents aged 31-35 years (33%), and 36- 40 years as many as 1 respondent (0.7%). The results show that respondents in the experimental group with employment levels were mostly 11 respondents (73%) as housewives, 3 respondents (20%) worked as private employees and 1 respondent (0.7%) worked as traders. Meanwhile, respondents in the control group, with employment levels mostly as housewives, were 10 respondents (67%), as private employees were 3 respondents (20%), and as traders were 2 respondents

(13%). Based on the results, there were 3 respondents in the experimental group with tertiary education (20%), 5 respondents from junior high school (33%), 7 respondents from high school (47%). Meanwhile, the control group showed that there were 3 respondents with tertiary education (20%), 3 respondents from junior high school (20%), and 9 respondents from high school (60%).

Bivariate
Effectiveness of Antenatal Training on Maternal Anxiety Levels During Gestation at the Sobang Community Health Center
Based on Table 5, it shows that the sig. 2 tailed for the experimental and control groups has a value of <0.05, so the hypothesis shows that Ha is accepted or that there is effectiveness of Antenatal Training on the anxiety level of mothers during gestation at the Sobang Community Health Center in 2024. This is in line with research conducted by Yunitasari et al. (2021). The aim of the research is to find out what influences the anxiety and sleep quality of mothers during the third trimester of gestation when facing childbirth (Joh et al., 2016; Sharma et al., 2018; Vora et al., 2024). The results of the research were that the average score for the level of self-confidence of mothers during gestation before giving was 65.66 with a standard deviation of 4.73, the lowest score was 56 and the highest score was 77. And the average score for the level of sleep quality was 70.80 with a standard deviation of 3.06, score the lowest score was 64 and the highest score was 78. Conclusion: There is an influence of Antenatal Exercise on maternal anxiety and sleep quality during the second and third trimesters of gestation (Indriani et al,. 2023).

Another research was conducted by Wardani & Sagita (2023). The aim of this study was to determine the effect of Antenatal Exercise on the level of anxiety of primigravida gestation mothers facing childbirth in the Tanjung Raja Health Center Working Area, North Lampung Regency in 2022. The results of the univariate analysis showed that before the Antenatal Exercise intervention was given, the average anxiety score of respondents was 49.73 and after the intervention was given. The average anxiety score of respondents was 49.73. The results of bivariate analysis show that there is an influence of Antenatal Training on the level of anxiety of mothers during the third trimester of primigravida gestation facing childbirth in the Tanjung Raja Community Health Center Working Area, North Lampung Regency in 2022 with p-value 0.000. For mothers during gestation to be able to do exercise during gestation using the assistance of health workers as management in reducing the level of anxiety of mothers during the third trimester of gestation approaching delivery (Bervoets et al., 2015; Skillgate et al., 2020).

There is also other research that is also in line with the research conducted by researchers, namely research conducted by Wahyuni et al. (2022). This research aims to find out the effect of providing exercise during gestation on the anxiety level of mothers during gestation at the Bunda Setia Maternity Home (Rustikayanti et al., 2016). The research used analytical techniques with a cross sectional study with a sample size of 50 respondents. Sampling used a simple random sampling method (Aprilia & Setyorini, 2017). The results of this research showed that mothers during pregnancy who participated in exercise had a proportion of mild anxiety of 100% and mothers who did not participate in exercise had a level of mild anxiety of 36% and moderate anxiety of 64%. There was a difference in anxiety scores between mothers who participated in exercise compared to those who did not participate in exercise ($p < 0.05$). There is an influence of frequency and gravida of Antenatal Exercise on anxiety level $p < 0.05$. In conclusion, pregnancy exercise has an effect on the level of anxiety in mothers during gestation (Prawirohardjo, 2020).

Effectiveness of Antenatal Exercise on Maternal Pain Perception During Gestation at the Sobang Community Health Center

Based on Table 6, it shows that the Assymp sig. 2 tailed for the experimental and control groups has a value of < 0.05, so the hypothesis shows that Ha is accepted or that there is effectiveness of Antenatal Exercise on mothers' perception of pain during gestation at the Sobang Community Health Center in 2024. This research is in line with research conducted by Sari (2019). The aim of this research was to analyze Antenatal Exercise on pain perception. The results of this study showed that there was an influence of Antenatal Exercise on maternal pain perception during gestation with a p value of $p = 0.004$.

Effectiveness of Antenatal Training on the Maternal Childbirth Process During the Gestation Period at the Sobang Community Health Center

Based on Table 7, it shows that the Assymp sig. 2 tailed for the experimental and control groups has a value of < 0.05, so the hypothesis shows that Ha is accepted or that there is effectiveness of Antenatal Training on the birth process of mothers during gestation at the Sobang Community Health Center in 2024. The aim of this research is to determine the effectiveness of the implementation of Antenatal Exercise on the smooth delivery process for mothers giving birth at the Masitah Muara Jawa Clinic. The results of the study showed that the majority of mothers during pregnancy participated in antenatal training activities, namely 46 people (63%). The smooth delivery process for mothers during gestation at the Masitah Muara Jawa Clinic was mostly smooth, as many as 48 people (65.8%) and the implementation of Antenatal Exercise was effective in the smooth delivery process at the Masitah Muara Jawa Clinic, shown by a p value of 0.000 and OR = 23.429.

The conclusion of this research is that Antenatal Exercise is effective in smoothing the birthing process. Suggestions for the Health Service to further improve the Antenatal Exercise programs through classes for mothers during the gestation period in each village or sub-district, to further increase the community's understanding of the importance of carrying out Antenatal Exercise (Dewanjee et al., 2023; Smith et al., 2022; Wang et al., 2022). For the Masitah Clinic, it is improving services to mothers during gestation, especially those who undertake ANC, so that they are willing to take part in antenatal training. Apart from that, research conducted by Agustina et al. (2020) is also in line with research conducted by researchers. The aim of the research is to analyze and review journals related to the effectiveness of prenatal gentle yoga and antenatal exercise on the birth process. Method: literature review searching database journals (Google Search and Google Schoolar) between 2010 and 2020, search and literature selection process in research using Prisma diagrams.

The results of the Literature Review Research state that doing prenatal gentle yoga and Antenatal Exercise can help with the birthing process so that it can reduce pain and anxiety when the mother gives birth (Carayannopoulos et al., 2024; Shem et al., 2020). The conclusion of the Literature Review research is that providing prenatal gentle yoga and antenatal exercises can facilitate and help mothers during the birth process, thereby reducing the incidence of cesarean sections and complications during childbirth (Wiarto, 2017; Safitri & Desmawati, 2022). This is also in line with research conducted by Sulistyawati et al. (2022). The general aim of this research is to determine the effect of antenatal training on the smoothness of the birth process. The data obtained were processed using the chi-square test (X^2) with a significant level of $\alpha = 0.05$. The results of the study showed that there was a reasonable relationship between pregnancy exercise and the smoothness of the birth process with a value of $P = 0.007$. Most of the respondents carried out pregnancy exercise during the process. Delivery is faster than those who do not do Antenatal Exercise (Setiawati, 2019).

Conclusion

Based on the results and discussion of this research, it can be concluded that the Antenatal Exercise program has a significant positive impact on mothers during the

gestation period in various important aspects. First, there is a decrease in the level of anxiety experienced by mothers during the gestation period after participating in Antenatal Training. This decrease in anxiety is likely due to several factors, including the mother's increased understanding of the birthing process and the relaxation techniques gained through the exercise. Antenatal exercise often involves breathing techniques, meditation and physical exercise which can help the mother feel calmer and ready to face the birth process. Thus, participation in this program helps reduce the levels of stress and anxiety often experienced during the gestation period. Second, this research also shows that Antenatal Exercise is effective in reducing the perception of pain felt by the mother during the gestation period. The exercises in this program are designed to increase the strength and flexibility of the muscles involved in the birthing process, such as the pelvic and abdominal muscles. By doing regular exercise, mothers can increase their physical capacity, which in turn helps reduce muscle tension and improve body posture. This reduction in tension contributes to a reduction in the perception of pain during gestation and the birthing process. The breathing techniques learned during exercise can also help mothers manage pain more effectively. Third, Antenatal Exercise has been proven to be effective in influencing the birth process. Mothers who take part in this program report a smoother and more controlled birth experience. Antenatal exercise prepares the mother's body to face the physical challenges associated with childbirth, such as increasing endurance and reducing the risk of complications. This program can also provide mothers with skills for managing contractions and recovery techniques after giving birth. Thus, Antenatal Exercise not only provides benefits during the gestation period but also contributes to a more efficient and more comfortable delivery process.

Author Contributions
R.K., I.M., N., N.N., S., S.R., S.N. contributed to the conceptualization, data collection process, data processing, and article writing.

Conflicts of Interest
The authors declare no conflict of interest.

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