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Effectiveness of warm compress and deep breathing on labor pain intensity

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Abstract

Childbirth is a natural process that causes severe pain due to uterine contractions. If left uncontrolled, it can lead to prolonged labor and threaten the safety of the mother and fetus. This study aims to analyze the effectiveness of a combination of warm compresses and deep breathing relaxation on the intensity of labor pain during the active phase of the first stage of labor in mothers giving birth. This study used a quasi-experimental design with a two-group pretest and posttest with control group design. A total of 32 women in active phase I labor at the Karanganyan Community Health Center were respondents, with 16 in the experimental group receiving warm compress and deep breathing relaxation intervention, and 16 in the control group receiving deep breathing relaxation. Pain intensity was measured using the Numeric Rating Scale (NRS) before and after the intervention. Data analysis was performed using the Paired T-Test, Wilcoxon, and Mann Whitney tests. The results showed a decrease in average pain intensity of 1.84 in the experimental group, while the control group only experienced a decrease of 1. The statistical test p-value of 0.003 ($p < 0.05$) showed that the combination of warm compresses and deep breathing relaxation was more effective in reducing pain intensity during active phase I labor compared to deep breathing relaxation alone. This conclusion indicates the significant effectiveness of warm compresses and deep breathing relaxation in reducing labor pain intensity.

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INTRODUCTION

Childbirth is a natural physiological process in which the fetus, placenta, and membranes are expelled from the uterus through the birth canal (Martin, Rokibullah, & Sofinia, 2022; Lupu et al., 2023). This process begins with uterine contractions that cause dilation and thinning of the cervix and uterine ischemia, leading to pain responses (Gasner, & Aatsha, 2023; Astruc et al., 2024; Tandondo, Yulianti, & Irmayanti, 2025). Pain during childbirth starts in the first stage, particularly in the latent phase (up to 3 cm dilation) and becomes more intense during the active phase (4–10 cm dilation). At the peak of cervical dilation, contraction intensity and frequency increase, resulting in maximum pain sensation (Yanti, 2018). During this process, mothers experience strong and frequent uterine contractions, leading to significant discomfort and pain (Sulisdiana, Mail, & Rufaida, 2019). The pain response arises from both physiological and psychological mechanisms, where anxiety and tension can exacerbate uterine contractions, prolong labor, and increase maternal distress (Mitayani, 2019).

Despite being a normal event, labor pain remains one of the most feared experiences for women. National data show that maternal mortality in Indonesia has decreased from 305 deaths per 100,000 live births in 2015 to 189 per 100,000 live births in 2020. However, complications during labor—such as prolonged labor due to uncontrolled pain—still contribute indirectly to maternal deaths (Ministry of Health of the Republic of Indonesia, 2022). In West Kalimantan Province, maternal mortality increased from 115 deaths in 2020 to 183 deaths in 2021, equivalent to 214 deaths per 100,000 live births, while in Landak Regency, the rate reached 119 per 100,000 live births (Dinas Kesehatan Provinsi Kalimantan Barat, 2022). Uncontrolled pain during labor can cause 35% of mothers to experience prolonged labor, 12% postpartum hemorrhage, and 10% babies born with caput succedaneum (Dartiwen, 2023).

About 90% of mothers experience severe pain during labor, which can lead to trauma, anxiety, and even fear of future pregnancies (Marawita, Soraya, & Putri, 2023). Physiologically, severe pain increases blood pressure, heart rate, and respiratory rate (Fitrianingsih, 2018). Such pain can hinder cervical dilation and prolong the first stage of labor. Non-pharmacological methods—such as warm compresses and deep breathing relaxation—are recommended to manage labor pain because pharmacological methods may have adverse effects on both the mother and the fetus (Kumalasari, 2020; Suriani, Nuraini, & Siagian, 2019). Warm compresses reduce pain perception by stimulating the body's endogenous opioid system (Suyani, 2020), while breathing relaxation helps mothers cope effectively with contractions. Research has shown that warm compresses can reduce labor pain by 47.05% (Soeparno, 2020), and combining relaxation techniques with position changes significantly decreases pain intensity (Ola, 2023; Parapat, Simanjuntak, & Tarigan, 2022).

Previous studies have largely focused on the independent effects of either warm compresses or breathing relaxation on pain reduction during labor. However, comparative research examining which of the two interventions is more effective in reducing pain intensity during the first stage of labor remains limited, particularly in rural health facilities such as those in Landak Regency. This represents an important research gap, as identifying the most effective and practical pain management method can help midwives improve the quality of maternal care and comfort during childbirth. The novelty of this study lies in its direct comparison of warm compress and deep breathing relaxation techniques, both of which are non-invasive, low-cost, and easily applicable methods suitable for community health center settings.

Based on the survey results at the Karanganyan Community Health Center, 10 mothers reported experiencing severe pain during the active phase of the first stage of labor, especially in the abdomen, back, and spine, with pain increasing as cervical dilation

progressed. Therefore, this study aims to determine the comparative effectiveness of warm compresses and deep breathing relaxation techniques in reducing pain intensity among mothers during the first stage of labor at the Karangany community health center in Landak Regency.

METHOD

This study employed a quantitative approach with a quasi-experimental design using a two-group pretest–posttest control group design. This design was used to determine the effect of warm compresses and breathing relaxation on pain intensity among mothers in the first active phase of labor. The sampling technique used in this study was non-probability sampling with the consecutive sampling method, meaning that all subjects who met the inclusion criteria during the research period were included as respondents until the required sample size was met.

The data collection technique was carried out through direct observation, by measuring and recording the level of pain felt by respondents before and after the interventions of warm compresses and breathing relaxation. The Numeric Rating Scale (NRS) was used to measure pain intensity, where respondents rated their pain on a scale of 0 to 10, with 0 indicating no pain and 10 indicating the most severe pain imaginable.

The data analysis consisted of univariate and bivariate analyses. Univariate analysis was used to describe the characteristics and pain intensity levels of respondents before and after the interventions. Bivariate analysis was conducted using the Mann–Whitney U Test, a non-parametric statistical test used to determine differences in pain intensity between the warm compress and breathing relaxation groups in mothers during the first active phase of labor. This study obtained ethical approval from the Ethics Committee of the Pontianak Ministry of Health Polytechnic with approval number 134/KEPK-PK.PKP/III/2024.

RESULTS AND DISCUSSION

Table 1. Frequency Distribution of Respondent Characteristics.

Characteristic	N	Percentage
Mother's age		
< 20 years old	6	16.7
20–35 years	26	72.2
Over 35 years old	4	11.1
Education		
Primary	23	63.9
Secondary	12	33.3
Higher	1	2.8
Parity		
Primipara	13	36.1
Multipara	22	61.1
Grandemultipara	1	2.8
Employment		
Not employed	25	69.4
Working	11	30.6
Total	36	100

Based on Table 1, the majority of respondents (72.2%) were aged 20–35 years, which is the productive age group for childbirth. In terms of education, most respondents (63.9%) had a primary education level. The majority of respondents (61.1%) were multiparous, indicating that they had given birth more than once. Regarding employment status, most respondents (69.4%) were not employed.

Table 2. Differences Before and After Warm Compresses and Deep Breathing Relaxation

Group	Pre-test			Posttest			p-value
	Mean±SD	Median	Min-Max	Mean±SD	Median	Min-Max	
Experiment	1.237	6.00	4 - 8	3.83	4.00	2 - 6	*0.000
Control	1.335	6.0	4 - 9	5.39	5.50	3 - 7	**0.001

Description: *paired t-test

**Wilcoxon

Based on Table 2, in the experimental group, the average pain scale before applying warm compresses and deep breathing relaxation was 5.67, and the average of 3.83 after receiving warm compresses and deep breathing relaxation, indicating a decrease in labor pain intensity with a p-value of 0.000, meaning there was a significant difference in the labor pain scale before and after receiving warm compresses and deep breathing relaxation for labor pain in the active phase of the first stage of labor. This indicates a difference in the average labor pain scores between the pretest and posttest. Meanwhile, in the control group, the average labor pain score before deep breathing relaxation was 6.39, and the average score after deep breathing relaxation was 5.39, indicating a decrease in labor pain intensity with a p-value of 0.001, meaning there was a significant difference in labor pain scores before and after deep breathing relaxation during the of 6.39, and the average value after deep breathing relaxation was 5.39, meaning there was a decrease in labor pain intensity with a p-value of 0.001, indicating a significant difference in labor pain scale before and after deep breathing relaxation was administered for labor pain during the active phase of the first stage of labor.

Table 3. Effectiveness of Warm Compresses and Deep Breathing Relaxation on Labor Pain in the Active Phase of the First Stage of Labor.

Group	N	Mean Difference	Median	p-value
Experiment	18	1.84	4.00	*0.003
Control	18	1	5.5	

Description: * Mann Whitney

Based on Table 3, the statistical test results show a p value of 0.003 ($p < 0.05$), meaning H_0 is rejected and H_a is accepted, which means there is a significant effect between the experimental group (application of warm compresses and deep breathing relaxation) and the control group (application of deep breathing relaxation) on the reduction of labor pain scale in the first stage of active labor.

The difference in the average pain scale of the experimental group before and after being given warm compresses and deep breathing relaxation was 1.84, while in the control group, the difference in the average pain scale before and after being given deep breathing relaxation was 1. Thus, the highest difference in mean values was found in the administration of warm compresses and deep breathing relaxation, which was more effective than deep breathing relaxation alone.

DISCUSSION

Characteristics of Respondents in the Active Phase of the First Stage of Labor.

The results of the study show that of the 36 respondents, the majority (72.2%, or 26 people) were aged 20-35 years, while 16.7% (6 people) were aged < 20 years and 11.1% (4 people) were aged > 35 years. Age is the length of time a person has lived (since birth or conception). In terms of healthy reproduction, it is known that the safe age for pregnancy and childbirth is between 20 and 35 years old. The older a person is, the more mature they

are in their thinking. A mother's age is related to her reproductive organs . The healthy and safe reproductive age is 20-35 years. Pregnancy under the age of 20 and over the age of 35 can lead to high-risk pregnancies because biologically, women under the age of 20 are not yet optimal, their emotions tend to be unstable, and they are not yet mentally mature, making them prone to turmoil that results in a lack of attention to fulfilling their nutritional needs during pregnancy. Meanwhile, at age 35, related to the decline and reduction in immune system function and various diseases that affect this age group, as well as the increasing age of the mother, there will be a progressive decline in the endometrium, so that to meet the nutritional needs of the fetus, wider placental growth is required (Kumalasari, 2020) .

The characteristics of respondents based on education are mostly 63.9% (23 people) with elementary education, while 33.3% (12 people) and 2.8% (1 person) have higher education. The level of education can affect the level of knowledge of respondents because a person's ability to receive and understand is determined by their level of education. The acceptance and understanding of information received by someone with higher education is better than someone with lower education (Marmi, 2019) .

Based on parity, most respondents, namely 61.1% (22 people), were multiparous, while 36.1% (13 people) were primiparous and 2.8% (1 person) were grandemultiparous. Parity is the number of live births that respondents have had. Based on the number, a woman's parity can be classified as nulliparous, which is a woman who has never given birth, primiparous, which is a woman who has given birth once, multiparous, which is a woman who has given birth two to four times, and grandemultiparous, which is a woman who has given birth to 5 or more children. Parity influences a mother's preparation for childbirth; mothers who have previous childbirth experience are more knowledgeable and understand the equipment and other preparations needed for childbirth (Mitayani, 2019) .

The characteristics of the respondents' employment status showed that the majority, 69.4% (25 people), were unemployed, while 30.6% (11 people) were employed. Pregnant women can continue to work, but their activities should not be too strenuous. Pregnant women are advised to rest as often as possible. A pregnant woman is advised to stop her activities if she feels any discomfort during her pregnancy. Physical activity also affects the nutritional needs of pregnant women. If a woman is not in good health, strenuous activity can cause glucose to be diverted from the fetus and placenta to the mother's muscles for energy production. This can also cause fetal hypoxia because blood flow through the placenta is diverted to the mother, reducing oxygen supply (SARI 2022) .

The Effectiveness of Warm Compresses and Deep Breathing Relaxation on Pain During the Active Phase of the First Stage of Labor.

The results of bivariate analysis using a paired t-test in the experimental group with warm compresses and deep breathing relaxation to reduce the intensity of labor pain in the active phase of stage I showed that the average value before intervention was 5.67 and after intervention was 3.83. The maximum value of labor pain intensity before intervention in the experimental group was 8 and the minimum value before intervention was 4. Meanwhile, the maximum value after intervention was 6 and the minimum value after intervention was 2. The statistical test results showed a p-value of $0.000 < 0.05$, which means that the application of warm compresses and deep breathing relaxation had an effect on reducing the intensity of labor pain during the active phase of the first stage of labor.

The results of bivariate analysis using the Wilcoxon test in the control group with deep breathing relaxation to reduce the intensity of labor pain in the active phase of stage I showed that the average value before intervention was 6.39 and after intervention was 5.39. The maximum value of labor pain intensity before the intervention in the control group was 9 and the minimum value before the intervention was 4. Meanwhile, the maximum value

after the intervention was 7 and the minimum value after the intervention was 3. The statistical test results showed a p-value of $0.001 < 0.05$, which means that deep breathing relaxation has an effect on reducing the intensity of labor pain during the active phase of the first stage of labor.

Based on bivariate analysis of the experimental and control groups using the Mann Whitney test to determine the effectiveness of warm compresses and deep breathing relaxation on the intensity of labor pain before and after the application of warm compresses and deep breathing relaxation. The statistical test results obtained a p value of 0.003 ($p < 0.05$), meaning that there was a significant difference between the experimental group (warm compress and deep breathing relaxation) and the control group (deep breathing relaxation) in terms of the reduction in labor pain scale in the active phase of stage I.

Pain intensity is a description of how severe the pain is felt by an individual. The measurement of pain intensity is highly subjective and individual, and it is possible that two different people will experience the same intensity of pain very differently.

Pain during labor is caused by stretching of the lower segment of the uterus during cervical contractions. Contractions during childbirth cause pain due to cervical contractions and dilation (widening) of the cervix and lower uterine segment. The intensity of pain is proportional to the strength of contractions and pressure. Pain increases when the cervix is fully dilated due to pressure from the baby against the pelvic structure, followed by stretching and tearing of the birth canal. In addition, various physical and psychological barriers experienced by mothers during labor will increase the pain. The severe pain experienced during childbirth often leads mothers to seek the easiest and quickest methods to alleviate the pain, prompting various efforts to reduce pain during childbirth, both through pharmacological and non-pharmacological means.

Warm compresses are one non-pharmacological method for relieving pain or discomfort. Warm compresses can be applied in midwifery care because they are efficient and effective without requiring prior skills. This method has several side effects if used correctly. The local effect of warm compresses on labor pain states that warm compresses cause a significant increase in uterine activity without showing abnormal changes in the fetal heart. Researchers state that warm compresses are a new non-pharmacological approach to stimulate uterine contractions with a shorter duration of labor.

In addition to warm compresses, relaxation is also a technique that can relax the mind and body through a process that progressively releases muscle tension throughout the body. Relaxation techniques are useful in various situations, such as pain, anxiety, lack of sleep, stress, and emotional outbursts.

Breathing relaxation techniques are pain relief techniques that provide the greatest benefit because relaxation techniques during childbirth can prevent excessive mistakes after childbirth. Breathing relaxation during the birthing process can reduce anxiety and fear so that mothers can adapt to the pain during childbirth.

The results of this study are in line with Soeparno's 2020 study entitled "The Effect of Warm Compresses on Reducing Pain Intensity During the First Stage of Labor," which showed that before the warm compresses were applied, the majority of respondents had a severe pain scale of 11 people (73.3%), and a minority of respondents had a very severe pain scale, namely 1 person (6.7%). After the warm compress was applied, the results showed that the majority of respondents had a moderate pain scale, namely 8 respondents (53.3%), and a minority of respondents had a mild pain scale, namely 3 people (20.0%). The results of the study indicate that warm compresses have an effect on reducing the intensity of pain during the active phase of labor on a moderate to severe pain scale. Before the warm compresses were applied, the level of pain experienced by the mothers in labor was moderate to severe, and after the warm compresses were applied for 15-20 minutes, the intensity of pain experienced by the mothers in labor became mild to moderate.

The results of this study are also in line with the research conducted by Sari in 2021 entitled "The Effect of Breathing Relaxation Techniques on Pain Intensity during the Active Phase of the First Stage of Labor at PMB Meyta Eka Faulia, S.ST. South Abung District, North Lampung Regency, 2021," showed that the average pain level in mothers before being given relaxation techniques was 6.18 (moderate category), with a minimum pain level of 4 and a maximum of 9, with a standard deviation of 1.435. The average pain level in mothers in labor after being given relaxation techniques was 4.77 (moderate category), with a minimum pain level of 3 and a maximum of 6, with a standard deviation of 1.270. The statistical test results obtained a p-value of 0.000, so it can be concluded that relaxation techniques have an effect on reducing pain levels in mothers in labor during the first stage of active labor at PMB Meyta Eka Faulia, S.ST.

Through direct observation of respondents, researchers can determine and see firsthand the effects of warm compresses and deep breathing relaxation techniques administered to mothers in labor. Overall, based on the researchers' observations, all respondents reported on average that their labor pains had decreased, although their responses varied.

Based on the statistical test results from two groups, namely the experimental group and the control group in this study, there was a difference in the average difference in the reduction of labor pain intensity before and after the intervention was given. In the experimental group, the average difference in labor pain was 1.84. Meanwhile, the average difference in labor pain in the control group was 1. Thus, it can be concluded that the experimental group experienced a more significant reduction in labor pain intensity compared to the control group.

Thus, it can be said that there is a significant effect of warm compresses and deep breathing relaxation on the intensity of pain during the active phase of labor at the Karanganyan Community Health Center, because most mothers in the active phase of labor experienced a decrease in pain scale after being given warm compresses and deep breathing relaxation.

CONCLUSION

It can be concluded that there was a significant difference in pain intensity during the active phase of the first stage of labor before and after the application of warm compresses and deep breathing relaxation. The use of deep breathing relaxation alone also resulted in a significant reduction in labor pain intensity (p-value = 0.001). Furthermore, the results of the bivariate analysis using the Mann–Whitney test (p-value = 0.003 < 0.05) indicated that the combination of warm compresses and deep breathing relaxation was more effective in reducing pain intensity during the active phase of the first stage of labor compared to deep breathing relaxation alone.

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