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Mastitis Pain In Postpartum Mothers Using Plumeria Rubra L Ointment

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Abstract

Treatment of mastitis is usually carried out pharmacologically by giving antibiotics, but the content of antibiotics can pass into breast milk, so an alternative solution is needed for the problem of using herbal plants. Plumeria rubra L was processed into an ointment so that it was easy to use. This study aimed to determine the intensity of postpartum maternal mastitis pain with the use of 5% Plumeria rubra L ointment. The research design was a true experiment pre-post test control group design. Respondents were divided into 2 groups, namely intervention and control, totaling 32 people. The intervention was given by 5% Plumeria rubra L ointment applied to the breasts of postpartum mothers who were given twice a day in the morning and evening for seven days with a size of 5 grams for each use. The result was the intensity of postpartum mastitis pain in the previous control group, most of the percentage was severe pain as much as 66.7%, and after most of the presentations, namely moderate pain as much as 60.0%. The intensity of mastitis pain for postpartum mothers before using red frangipani ointment was mostly the percentage, namely severe pain at 73.3%, and the intensity of mastitis pain for postpartum mothers after using red frangipani ointment, most of the percentages were moderate pain 53.3%. The conclusion obtained was a p-value of 0.004 which indicates a significant difference. To reduce mastitis pain, postpartum mothers can use red frangipani ointment for 7 days.

Introduction

Breastfeeding provides many benefits for the growth and development of infants (Alonso *et al*., 2020). However, the breastfeeding process can be hampered due to several problems, one of which is mastitis or breast inflammation caused by sores on the nipples (Alsaleh, 2021). Lack of knowledge about proper breastfeeding techniques is a major factor in the occurrence of mastitis (Aly *et al*., 2022). The World Health Organization or WHO estimates that 1.4 million people suffer from mastitis and of these 39.5% are postpartum mothers (Andjić *et al*., 2022). The incidence of mastitis cases in postpartum mothers in Indonesia reaches 10% and most cases occur within the first 12 weeks (Andjić *et al*., 2022). The Suwawa Community Health Center in Bone Bolango District, Gorontalo, has recorded an increase in mastitis cases every year, accounting for 30% of the total postpartum mothers. Inappropriate management of mastitis can exacerbate the situation so that it can cause life-threatening septic shock (Bai *et al*., 2022). One of the efforts to prevent mastitis is by providing knowledge of correct breastfeeding techniques to postpartum mothers, but these efforts have not been effective, this can be seen from the increase in cases of mastitis every year, so proper treatment is needed to prevent complications (Bihani, 2021). Treatment of mastitis is usually carried out pharmacologically by giving antibiotics, but antibiotics can pass into breast milk and cause side effects in the baby, so an alternative solution is needed for this problem (Bintang *et al*., 2021).

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Indonesian people often use herbal plants to save costs and reduce the side effects of chemicals. One of the plants that is easy to find and often used by the community because of its many uses is Plumeria rubra L(Plumeria rubra L) (Deng *et al*., 2021). Its content is in the form of saponins which are useful as vasodilators, anti-inflammatories, and analgesics (Deng *et al*., 2021). Besides that, it also contains essential oils which are useful as antianxiety (DiLauro *et al*., 2020). The red color of Plumeria rubra L also indicates high levels of antioxidants. Plumeria rubra L is processed into an ointment so that it can be easily used as a spread on the skin surface (Djannah *et al*., 2022). Ointment dosage forms have the advantage of being stable in use and storage (Farahnik & Murase, 2016). The purpose of this study was to determine the use of 5% Plumeria rubra L ointment in postpartum women who had mastitis. Specifically, this study aims to analyze the effect of Plumeria rubra L 5% ointment intervention on mastitis pain in postpartum women, analyze the effect of lanolin on mastitis pain in postpartum mothers, analyze the differences in the effect of Plumeria rubra L 5% ointment intervention and lanolin on mastitis pain in postpartum women at the Public Health Center. Suwawa. Urgency in general, the output of this study can be used as government input in midwifery practice to reduce postpartum maternal mortality caused by inappropriate management of mastitis and reduce the side effects of using antibiotics in postpartum mothers on babies. In particular, this research is important because it can reduce discomfort and prevent postpartum blues. From an economic standpoint, this research can also reduce the burden on mothers who have mastitis.

Method

The research was conducted at the Suwawa Health Center. The research design that will be used is a true experimental pre-post-test control group design. The design was used to test two related samples. Evaluation of mastitis pain used a numerical rating scale. The intervention would be given Plumeria rubra L 5% ointment which would be applied to the breast that has mastitis. Plumeria rubra L 5% ointment was given twice a day in the morning and evening for seven days with the use of 5 grams for each use. For the control group, only lanolin was used as therapy. Data analysis to see the research variables descriptively and determine the relationship between the independent variables and the dependent variable used the independent t-test. The population in this study were all postpartum mothers who experienced mastitis and met the inclusion criteria at the Suwawa Health Center, a total of 64 obtained from the average postpartum mother at the Suwawa Health Center in 2021. The sampling technique for this study used purposive sampling with the criteria of mothers who were willing to be respondents, postpartum mothers with mastitis, age 20-35 years, multipara, LILA >23.5 cm, and exclusion criteria of smoking, diabetes, and using breast implants.

Result and Discussion

Table 1. Frequency Distribution of Characteristics of Postpartum Mothers

Characteristics of Respondents	N	%
Age		
< 20 years old	-	-
20 - 35 years old	64	100.0
> 35 years old	-	-
Paritas		
1 child	38	60,0
2 child	23	36,7
≥3 child	3	3,3

Source: Primary Data, 2023

Based on Table 1 the characteristics of the respondents according to age, all postpartum mothers were 64 people (100.0%) aged 20-35 years and there were no postpartum mothers who were more than 35 years old or less than 20 years old. Characteristics of respondents based on parity, the majority of respondents had 1 child as many as 38 people (60.0%), had 2 children as many as 23 people (36.7%) while having 3 or more children was 1 person (3.3%).

Based on Table 2, it is known that the intensity of postpartum mastitis pain before using lanolin showed that of the 32 respondents in the control group, most of the 21 respondents (66.7%) had severe pain and 5 respondents (33.3%) had moderate pain. Based on Table 2, it is known that the intensity of postpartum mastitis pain after using lanolin showed that out of 32 respondents, most of

them were 19 respondents (60%) had moderate pain, 9 respondents (26.7%) had severe pain, and 4 respondents (13.3%) mild pain. Based on Table 2 it is known that postpartum mastitis pain before using Plumeria rubra L ointment showed that of the 32 respondents, most of them 24 respondents (73.3%) had severe pain and 8 respondents (26.7%) had moderate pain. Based on Table 2, it is known that postpartum mastitis pain after being given Plumeria rubra L ointment showed that out of 32 respondents, 17 respondents (53.3%) had moderate pain and 15 respondents (46.7%) had severe pain.

Table 2. Distribution Mastitis Pain Intensity Before Using Lanolin in the Control Group

Variables	Frequency	Percent (%)
Before Using Lanolin		
0 (no pain)	-	-
1- 3 (mild pain)	-	-
4- 6 (moderate pain)	11	33,3
7-10 (severe pain)	21	66,7
After Using Lanolin		
0 (no pain)	-	-
1- 3 (mild pain)	4	13,3
4- 6 (moderate pain)	19	60,0
7-10 (severe pain)	9	26,7
Before Using Plumeria rubra L Ointment		
0 (no pain)	-	-
1- 3 (mild pain)	-	-
4- 6 (moderate pain)	8	26,7
7-10 (severe pain)	24	73,3
After Using Plumeria rubra L Ointment		
0 (no pain)	-	-
1- 3 (mild pain)	15	46,7
4- 6 (moderate pain)	17	53,3
7-10 (severe pain)	-	-

Source: Primary Data, 2023

Table 3. Effect of Lanolin on Postpartum Mastitis Pain.

	Mean	Min	Max	SD	P value
Before	7,00	4,00	9,00	1,41	0,00
After	5,40	3,00	8,00	1,63	

Source: Primary Data, 2023

Based on Table 3 it is known that the results of the Kolmogorov-Smirnov Z test for postpartum mastitis pain before lanolin treatment had a p-value of 0.64 and after lanolin treatment was 0.53. The value of p> 0.05 indicates that both are normally distributed. Before giving lanolin for postpartum mastitis pain the lowest was 4.00, the highest was 9.00, the average was 7.00 with a standard deviation of 1.41 while after the treatment with lanolin using the lowest pain intensity was 3.00, the highest was 8.00, the average was 5, 40 with a standard deviation of 1.63. The average value of the difference between the first measurement and the second measurement is 1.60 with a standard deviation of 0.63. From the results of statistical tests with the sample T-test, the p-value is 0.00. The p-value <0.05 indicates that there is an effect of lanolin on postpartum mastitis pain.

Table 4. Effect of Plumeria rubra L ointment on Postpartum Mastitis Pain

	Mean	Min	Max	SD	P value
Before	7,00	5,00	9,00	1,00	0,00
After	3,80	2,00	6,00	1,08	

Source: Primary Data, 2023

Based on Table 4 it is known that from the results of the Kolmogorov-Smirnov Z test postpartum mastitis pain before using Plumeria rubra L ointment p-value of 0.90 and after treatment of Plumeria rubra L ointment using of 0.91. The value of p> 0.05 indicates that both are normally distributed. Before the treatment of giving Plumeria rubra L ointment for postpartum mastitis pain the lowest was 5.00, the highest was 9.00, the average was 7.00 with a standard deviation of 1.00 while after the treatment with Plumeria rubra L ointment, the lowest pain intensity was 2.00, the highest was 6.00, the average is 3.80 with a standard deviation of 1.08. The average value of the difference between the first measurement and the second measurement is 3.20 with a standard deviation of 0.94. From the results of statistical tests with the sample T-test, the p-value is 0.00. The p-value <0.05 indicates that there is an effect of Plumeria rubra L ointment on postpartum mastitis pain. The results of the Kolmogorov-Smirnov Z test for postpartum mastitis pain after treatment had a p-value of 0.37. The value of p> 0.05 indicates that

the variable is normally distributed. Levene test results in a p-value of 0.08. The value of p> 0.05 indicates that the variance in the two groups is the same. It is known that the average postpartum mastitis pain after using lanolin was 5.40 with a standard deviation of 1.63. While the average postpartum mastitis pain after using Plumeria rubra L ointment was 3.80 with a standard deviation of 1.08. From the statistical test results, it was obtained that the p-value was 0.004 at alpha 5%. The p-value <0.05 indicated that there was a significant difference in the average postpartum mastitis pain in the lanolin group and the Plumeria rubra L group.

In general, postpartum women experience pain during childbirth, but the intensity of this pain is different (fear and trying to fight the pain) and whether there is support from those around them (Fasihi *et al*., 2022). Parity also influences the perception of pain. Primiparas will experience pain more easily than multiparas (Fink *et al*., 2022). Multiparous mothers have experienced pain in multiparas so multiparas already have mechanisms to deal with pain in contrast to primiparas, mothers who have never had the first experience which causes emotional tension, anxiety, and fear which can exacerbate the pain. Pain intensity in primiparas is often more severe than pain in multiparas (Fink *et al*., 2022).

Factors that affect a person's pain include physiological factors of pain, psychological factors, perception factors, and pain tolerance. Physiological (physical) factors include opening, cervical effacement, lower uterine segment tension, peritoneum pulling, bladder pressure, hypoxia, vaginal pressure, parity (primipara/ multipara), then psychological factors include fear, panic, low self-esteem, anger, fear, anxiety, sexual activity disorder (Ghobadi *et al*., 2021). In addition, the perception factor is a factor that can trigger nociceptors and the pain tolerance factor is closely related to the presence of pain intensity which can influence a person to endure pain and someone who has experienced pain before (Gong *et al*., 2019).

From the results of the study, it was found that the distribution of pain intensity in the lanolin group before treatment was mostly severe pain percentage 66.7% (21 respondents) and moderate pain 33.3% (11 respondents). After the lanolin treatment, most of the percentages were moderate pain 60.0% (20 respondents), severe pain 26.7% (8 respondents), and mild pain 13.3% (4 respondents). The distribution of pain intensity in the Plumeria rubra L ointment group before treatment was mostly present, namely severe pain at 73.3% (23 respondents) and moderate pain at 26.7% (9 respondents). After the Plumeria rubra L ointment treatment, most of the percentages were moderate pain 53.3% (17 respondents), and mild pain 46.7% (15 respondents).

This is supported by the theory of pain control from Melzack and Wall suggesting pain impulses can be regulated or inhibited by defense mechanisms throughout the central nervous system. According to this theory, low-level activity in the small fibers that transmit data-noise-sensitive impulses is inhibited, and the first synapse is spliced by activity in the large ascending fibers and by activity in the descending fibers from higher centers in the brain (Infante *et al*., 2021). Melzack and Well proposed that intense activity in small fibers triggered by painful stimuli 'gates open' the first synapse whereas intense activity in heavy fibers 'gates shut' to painful stimuli (Lavon *et al*., 2019).

A balance of activity from sensory neutrons and descending control fibers from the brain regulates defense processes (Liao *et al*., 2021). Delta-A and C neurons release substance P to transmit impulses through defense mechanisms. In addition, there are mechanoreceptors, thicker beta-A neurons, which are more rapidly releasing inhibitory neurotransmitters (Mohamed-noriega *et al*., 2022). If the dominant input comes from beta-A fibers, it will close the defense mechanism (Mohamed-Noriega *et al*., 2022). It is believed that this closing mechanism can be seen when the postpartum companion gently rubs the client's back (Nakagawa *et al*., 2021). The resulting message will stimulate the mechanoreceptors, if the dominant input comes from delta A fibers and C fibers, it will open these defenses and the client will perceive the sensation of pain (Ohashi *et al*., 2022).

Even if pain impulses are transmitted to the brain, there are centers of the higher cortex in the brain that modify pain (Oliveira *et al*.,

2021). The descending nerve pathways release endogenous opiates, a natural painkiller that originates from the body (Pagé *et al*., 2022). This neuromodulator closes the defense mechanism by inhibiting the release of substance P. distraction techniques, lanolin, Plumeria rubra L ointment, hypnosis, and placebo use (Pérez-Báez *et al*., 2019). Added to Yanti's theory that postpartum pain is caused by adnexal, uterine, and pelvic ligament receptor stimulation (Politis *et al*., 2012). Stimuli are channeled from afferent tissues through the lower, middle, and upper parts of the hypogastric plexus, lower lumbar, and lower thoracic sympathetic chains to the lower nerve root ganglia at T10-L1. Pain can be transferred from the pelvic region to the navel (umbilicus), upper thighs, and mid-sacrum area (Quinlan-Colwell *et al*., 2022).

The pain is caused by a combination of stretching the lower uterine segment (and subsequently the cervix) and ischemia (hypoxia) the uterine muscles with an increase in the strength of the cervical contractions will be pulled, this strong contraction also limits the flow of oxygen resulting in ischemic pain (30). Pain is mostly caused by ischemia that occurs in the fibers and stronger contractions are felt more intensely on T12 and L1 cutaneous stimulation (Rouse *et al*., 2019). Based on the results of statistical tests using a paired t-test, the results ($p < 0.05$) showed that a p-value of 0.000 means that lanolin has a significant effect on postpartum mastitis pain in multiparous women. In postpartum mastitis, the muscles tighten in a tight pulling position with full force, and the muscles throughout the body tighten so that the process of pain in mastitis tends to be more painful than it should be. On the other hand, if the mother gives lanolin while pain occurs, the mother will feel comfortable using the lanolin technique. Appropriately and correctly will increase the mother's ability to control her pain and reduce anxiety, reduce catecholamine levels, stimulate blood flow to the uterus, and reduce muscle tension (Rouse *et al*., 2019).

Respondents' mastitis pain before and after using lanolin was generally different. This follows the theoretical concept that lanolin can reduce the pain experienced by mothers (Rouse *et al*., 2019). Here the mother still feels pain in the breast because lanolin only makes her feel comfortable (Shigematsu-Locatelli *et al*., 2022). Added to this is the concept that the condition of giving lanolin reduces muscle tension resulting in the postpartum muscles working in an integrated manner, where the circular muscles relax and pull up (Shimpuku *et al*., 2021).

Based on the results of statistical tests using a paired t-test, the results ($p < 0.05$) showed that a p-value of 0.000 means that frangipani red ointment has a significant effect on postpartum mastitis pain in multiparous women. To deal with pain during postpartum, non-pharmacological pain control methods are very important because they do not harm the mother or fetus, do not slow down postpartum if strong pain control is given, and have no allergic or drug effects (36). The non-pharmacological method is divided into three interacting components that affect the response to pain, namely effective-motivational strategies (central interpretation of messages in the brain that are influenced by one's feelings, memory, experience, and culture), cognitive-evaluative (central interpretation of messages located in the brain influenced by knowledge, one's attention, use of cognitive strategies, and cognitive evaluation of situations) and sensory-discriminatory (giving information to the brain according to physical sensations) (Smith *et al*., 2022).

Respondents' mastitis pain before and after applying Plumeria rubra L ointment was generally different. This is consistent with the theoretical concept that Plumeria rubra Lcan inhibit the passage of pain stimuli to the higher centers of the central nervous system (Timmers *et al*., 2021). Furthermore, tactile stimulation and positive feelings that develop when the form of attention, which is full of touch and empathy, strengthen the effect of Plumeria rubra L ointment to control pain (Tong *et al*., 2022). Added to this is the concept that Plumeria rubra L ointment is physical contact that gives a feeling of comfort with phytochemicals that will help balance energy and prevent disease (Tsuno *et al*., 2022). Physiologically stimulates and regulates the body, improving blood flow so that oxygen is carried effectively to the body's tissues (Ueshima, 2022) by relaxing tension.

Plumeria rubra L ointment also soothes the nerves (Underwood *et al*., 2022).

Based on the results of the above study it is known that the average mastitis pain after using lanolin is 5.40 with a standard deviation of 1.63. While the average postpartum mastitis pain after frangipani red ointment was 3.80 with a standard deviation of 1.08. The results of statistical tests using the independent t-test showed that (p <0.05) showed that the p-value was 0.004, meaning that there was a significant difference in the average postpartum mastitis pain in multiparous women in the lanolin group and the red frangipani group.

Mastitis pain is influenced by psychology including fear and anxiety which can stress the mother. Postpartum stress causes increased production of catecholamines (adrenaline and non-adrenaline) which can reduce vasodilation and increase blood vessel vasoconstriction so that blood flow decreases (Underwood *et al*., 2022). Lanolin reduces pain because it makes the skin experience relaxation and can also make fetal blood circulation smooth so that oxygen is fulfilled (Warkentin *et al*., 2021). Smooth blood circulation will also make the muscles weak and loose so that mastitis pain during postpartum can be reduced (Yang & Florio, 2021). This technique reduces pain and emotional distress during the postpartum period without the use of drugs (Yao *et al*., 2021).

This technique triggers a feeling of comfort through the surface of the skin. Red frangipani ointment for 7 days during postpartum helps mothers feel comfortable and free from pain because it stimulates vasodilators and the content of essential oils can also stimulate the body to release endorphins which are natural pain relievers and create feelings of comfort and good (S. Yu *et al*., 2020). The effectiveness of this method of bringing stimulation to the brain is smaller and slower than the broad touch fibers. When touch and pain are stimulated together, the sensation of touch travels to the brain closing the gate in the brain. The presence of red frangipani ointment which has a distraction effect can also increase the formation of endorphins in relaxing muscles (Z. N. Yu *et al*., 2020). Efforts to reduce maternal morbidity when experiencing mastitis during childbirth for multiparous mothers who have had previous experience of postpartum pain should be health workers introducing Plumeria rubra L ointment to the community so that multiparous mothers have the means to increase knowledge of reducing pain during postpartum in a cheap, easy and effective way (Zhang *et al*., 2020).

Conclusion

The distribution of postpartum mastitis pain in multiparous women before lanolin was mostly in the percentage, namely severe pain as much as 66.7%. The distribution of postpartum mastitis pain in multiparous women after lanolin is mostly moderate pain as much as 60.0%. The distribution of the intensity of postpartum mastitis pain in multiparous women before Plumeria rubra L ointment was mostly the percentage, namely severe pain at 73.3%. The distribution of the intensity of postpartum mastitis pain in multiparous women after Plumeria rubra L ointment is mostly the percentage, namely moderate pain at 53.3%. There is an effect of lanolin on postpartum mastitis pain in multiparous women. There is an effect of massage endorphin on postpartum mastitis pain in multiparous women. There was a significant difference in the average postpartum mastitis pain using the lanolin method and postpartum mastitis pain in multiparous women using Plumeria rubra L ointment with an average postpartum mastitis pain result after lanolin of 5.40 with a standard deviation of 1.63. Meanwhile, the average postpartum mastitis pain for multiparous women after frangipani red ointment was 3.80 with a standard deviation of 1.08. From the results of statistical tests, a p-value of 0.004 was obtained.

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