Potency of Aloe Vera Extract Transdermal Patch Treatment in Relief Pain and Breast Engorgement

Non Rachmani Yustiza[1], Krisdiana Wijayanti[2], Lanny Sunarjo[3], Melyana Nurul Widyawati[4]
[1,2,3,4]Poltekkes Kemenkes Semarang ; Jl. Tirto Agung, Pedalangan, Banyumanik, 024-7460274
nonrachmanii@gmail.com

About the Author

1. 1st Author : (Non Rachmani Yustiza, M.Tr.Keb)
   Affiliation : (Kebidanan Magister Terapan, Poltekkes Kemenkes Semarang)
   Mailing address : (Jl. Tirto Agung, Pedalangan, Banyumanik, Semarang, Jawa Tengah -Indonesia 50268)
   Email of author : (nonrachmanii@gmail.com)
   Orcid ID : https://orcid.org/0009-0001-3440-6274
   Google Scholar URL : https://scholar.google.com/citations?hl=id&user=eL4hnOwAAAAJ
   Phone number : 081278625629

   2nd Author : (Dr. Krisdiana Wijayanti, Bdn, M.Mid)
   Affiliation : (Kebidanan, Poltekkes Kemenkes Semarang).
   Mailing address : (Jl. Tirto Agung, Pedalangan, Banyumanik, Semarang, Jawa Tengah -Indonesia 50268)
   Email of author : (Wijayanti.k@hotmail.com)
   Orcid ID : https://orcid.org/0000-0001-6175-0428
   Google Scholar URL : https://scholar.google.com/citations?hl=id&user=viUDjYMAAAAJ
   Phone number : 081325185071

   3rd Author : (Dr. drg. Lanny Sunarjo, MDSc)
   Affiliation : (Terapis Gigi dan Mulut, Poltekkes Kemenkes Semarang).
   Mailing address : (Jl. Tirto Agung, Pedalangan, Banyumanik, Semarang, Jawa Tengah -Indonesia 50268)
   Email of author : (upm@poltekkes-smg.ac.id)
   Orcid ID : https://orcid.org/0000-0002-9635-5556
   Google Scholar URL : https://scholar.google.com/citations?hl=id&user=cN7p53MAAAAJ
   Phone number : 08562651394

   4th Author : (Dr. Melyana Nurul Widyawati, S.SiT, Bdn, M.Kes)
   Affiliation : (Kebidanan Magister Terapan, Poltekkes Kemenkes Semarang).
   Mailing address : (Jl. Tirto Agung, Pedalangan, Banyumanik, Semarang, Jawa Tengah -Indonesia 50268)
   Email of author : (pembelajaran.bumelyana@gmail.com)
   Orcid ID : https://orcid.org/0000-0003-2039-2892
   Google Scholar URL : https://scholar.google.com/citations?hl=id&user=G0WOG8UAAAAJ
   Phone number : 08122853514

ABSTRACT

***Background**: Breast engorgement influenced several factors, if not treated properly, can cause mastitis and failure breastfeed. Aloe vera contains flavonoids and tannins, as anti-inflammatories reduce pain and breast engorgement.*
***Purpose** : Prove transdermal potency of aloe vera extract patches reducing pain and breast engorgement.*
***Methods**: Type of research is quasy experiment, posttest only design with control group. Aloe vera patch as independent variable and dependent variable pain and breast engorgement. There were 32 subjects, divided 2 groups, 16 intervention and 16 controls. The intervention group given aloe vera patches and breastcare, the control group given breastcare. The intervention carried out 2 times a day in morning and evening, pasted 2 hours, 4 consecutive days. The instrument used Six Point Engorgement Scale (SPES) and Numeric Rating Scale (NRS). Data were analyzed using Mann Whitney and Wilcoxon.*
***Results**: The reduction breast engorgement scores on fourth day in intervention group had a greater average of 1,57 (p=0,000) than control group, 1,37 (p=0,000). The decrease pain score on fourth day in intervention group had a greater average of 1,44 (p=0,000) than control group 1,31 (p=0,001).*
***Conclusion**: The use of aloe vera extract transdermal patches as a non-pharmacological alternative effective reducing pain and breast engorgement.*

Keywords: Aloe Vera; Pain; Breast Engorgement

ABSTRAK

***Latar Belakang**: Pembengkakan payudara dipengaruhi beberapa faktor, apabila tidak mendapatkan penanganan baik dapat menyebabkan mastitis dan kegagalan menyusui. Patch lidah buaya memiliki kandungan flavonoid dan tanin sebagai anti-inflamasi membantu penurunan nyeri dan pembengkakan payudara.*
***Tujuan :** Membuktikan potensi transdermal patch ekstrak lidah buaya dalam mengurangi nyeri dan pembengkakan payudara.*
***Metode :** Jenis Penelitian ini quasy eksperiment, rancangan posttest only with control group. Patch lidah buaya sebagai variabel independen dan variabel dependen nyeri dan pembengkakan payudara. Subjek terdiri dari 32, terbagi menjadi menjadi 2 kelompok, 16 subjek intervensi dan 16 kontrol. Kelompok intervensi diberikan patch lidah buaya dan breastcare, kelompok kontrol diberikan breastcare. Intervensi dilakukan 2 kali sehari pagi dan sore, ditempelkan 2 jam, selama 4 hari berturut-turut. Instrumen yang digunakan adalah Six Point Engorgement Scale (SPES) dan Numeric Rating Scale (NRS). Data dianalisis menggunakan mann whitney dan wilcoxon.*
***Hasil :** Penurunan skor pembengkakan payudara hari keempat kelompok intervensi memiliki rerata lebih besar 1,57 (p=0,000) dibandingkan kelompok kontrol 1,37 (p=0,000). Penurunan skor nyeri payudara hari keempat kelompok intervensi memiliki rerata lebih besar 1,44 (p=0,000) dibandingkan kelompok kontrol 1,31 (p=0,001).*
***Kesimpulan :** Pemanfaatan transdermal patch ekstrak lidah buaya sebagai alternatif non farmakologis efektif mengurangi nyeri dan pembengkakan payudara.*

Kata kunci : Lidah Buaya; Nyeri; Pembengkakan Payudara

INTRODUCTION

Breastfeeding is a way to provide ideal food for the healthy growth and development of babies. Anti-infective substances contained in breast milk (ASI) help protect babies against disease. Breastfeeding also provides benefits for mothers such as preventing complications that occur during the puerperium.(Wijayanti et al., 2020) Breastfeeding cannot always proceed normally, not a few mothers complain that there is swelling of the breasts due to accumulation of milk, because the release of milk is not smooth or the method of sucking is not perfect by the baby.(Reni Haryani, 2012).

Breast milk that is not frequently removed will cause breast milk retention, the breasts are filled very full with milk, milk flow becomes obstructed and will cause the breasts to swell, then if the milk dam is not treated immediately it will result in continued severity. ASI dams are swelling of

the breasts due to increased venous and lymph flow, causing pain accompanied by an increase in body temperature. Symptoms that often appear during breast milk retention include swollen breasts, feeling hot and hard, feeling painful when pressed, reddish in color and the mother's body temperature up to 38ºC. If this event continues, it can result in mastitis and breast abscess.(Jamarrudin RN, 2022).

Intervention to reduce the symptoms of breast swelling is urgently needed. If there is no treatment, the production of milk will be disrupted resulting in the baby not getting breast milk from the mother or early weaning occurs. This breast swelling can develop into mastitis, an acute infection of the mammary gland, with clinical results such as inflammation, fever, chills, the mother becomes increasingly uncomfortable, fatigue, breast abscess up to septicemia.(Cunningham F gary, Leveno KJ, BLoom SL, 2013).

According to the latest World Health Organization (WHO) data in 2015 in the United States the percentage of breastfeeding women who experienced breast engorgement reached an average of 87,05% or as many as 8.242 postpartum mothers out of 12.765 people, in 2014 mothers who experienced breast engorgement were 7.198 people out of 10.764 people and in 2015 there were 6.543 mothers who experienced breast engorgement out of 9.862 people. According to the 2014 Indonesian Demographic and Health Survey Data, there were 35.985 postpartum women who experienced breast problems such as breast engorgement or (15,60%), and in 2015 there were 77.231 postpartum mothers who experienced breast engorgement or (37,12%).(Oktaviani et al., 2022)

Breast engorgement is common in postpartum mothers, 50% in primiparous women, 40% in multiparous women, and 10% of mothers do not experience breast engorgement. Breast engorgement is influenced by several factors such as the frequency of breastfeeding mothers, initiation of mothers in early breastfeeding, duration of breastfeeding, static milk, and early experience of breastfeeding.(Soetjiningsih, 2012)

During World Breastfeeding Week, indicated by WHO in 2020, it was stated that more than 40% of children were universally not breastfed, so mothers introduced food varieties that correlated with breast milk too soon. Children in Indonesia will generally be given water, starch water, nectar, tea, sugar water, and so on. With the goal of inclusive breastfeeding for half a year, Indonesia has not reached the target and still achieves an absorption capacity of 37,3%. After tracing based on the 2018 National Riskesdas Report, it was revealed that in Indonesia it has a prevalence of 65,7%.(Marmi, 2015)

Achieving exclusive breastfeeding is an indicator requirement in reducing infant mortality (IMR). One of the causes of the failure of exclusive breastfeeding is swelling in the mother's breast, so this study tries to reduce the level of breast engorgement and pain in the mother's breast so that exclusive breastfeeding can be achieved.

Ways to reduce breast engorgement can be done through pharmacology and non-pharmacology. Handling breast engorgement pharmacologically is by taking drugs such as Paracetamol, Ibuprofen, and lynoral(Berens et al., 2016). Non-pharmacological treatment is by means of breastfeeding more often, pumping milk, traditional breast care (hot compresses or cold compresses combined with massage), alternating hot and cold compresses, and ultrasound therapy.(Marmi, 2012)

One of the plants that has medicinal properties is Aloe Vera. Aloe vera can be used to treat breast pain due to menstruation or breast pain due to the process of breastfeeding. Aloe vera contains anthraquinone which contains aloin and emodin which can function as analgesics.(Surya, Gouri et

al.,2015). The analgesic activity of aloe vera is also associated with the presence of carboxypeptidase and bradykinase enzymes which can reduce pain. Pain reduction occurs through stimulation of the immune system.(Mwale & Masika, 2010)

Previous research used aloe vera in a gel dosage form to reduce breast engorgement.(Wizia & Susanti, 2021) Gel preparations have drawbacks, including having to use active substances that dissolve in water, so it is necessary to use solubility enhancers such as surfactants. With the use of gel surfactants it remains clear at various temperature changes, but the gel is very easily washed off or disappears when sweating, the high surfactant content can cause skin irritation and the price is more expensive.

Previous research no researchers have used aloe vera extract transdermal patch preparations to help reduce pain in breast engorgement. There have been previous studies that combined the ethanol extract of binahong leaves with Hydroxy Propyl Methyl Cellulose (HPMC) and Poly Vinyl Pyrrolidone (PVP) matrices. The transdermal patch is a dosage form that delivers drugs across the skin to produce systemic effects with the advantage of controllable drug release rates, avoiding first pass metabolism, and comfortable patch preparations for use by patients.(Ismiyati et al., 2019) Topical (through the skin) drug delivery system is an advantageous concept because the skin is easy to access, has a large surface area with external exposure to the lymphatic and circular tissue systems, and is a noninvasive route.(Handayani & Kautsar, 2018)

Based on the description of the background above, the hypothesis that will be proposed in this study is transdermal patches of aloe vera extract have the potential to be an alternative to healing breast pain and engorgement in nursing mothers.

METHOD

Participant characteristics and research design

This was a quasi-experimental study with simple random sampling control group posttest only design. This study was conducted in the Working Area of RST Bhakti Wira Tamtama and Ngesrep Health Center in Semarang City in March 2023. Inclusion criteria in this study were postpartum mothers on days 2-10 and mothers who breastfeed their babies, and experience signs and symptoms of breast engorgement. Exclusion criteria in this study were mothers who were allergic to aloe vera, mothers who had allergies or hypersensitivity to cold, and mothers who were moderately, severely, and very severely stressed.

Sampling procedures

The samples were selected using simple random sampling technique. At first the researcher identified all the characteristics of the population. Then the researchers determined the intended sample based on their considerations. The target population in this study were postpartum mothers on days 2-10 in the Working Area of the RST Bhakti Wira Tamtama and the Ngesrep Health Center in Semarang, as many as 65 mothers. A sample of 32 mothers was divided into 2 groups, 16 mothers in the intervention group and 16 mothers in the control group. Recommendations for the implementation of the research were obtained from the Poltekkes Kemenkes Semarang and permission provided by the study site.

Sample size, power, and precision

The estimated sample size used was calculated based on the sampling formula by A. Aziz Alimul Hidayat in Health Research Methodology and Data Analysis Techniques (Hidayat, 2014). Then the

results obtained were 16 people in the intervention group and 16 people in the control group, so that the total sample involved was 32 people. The variables involved here include the independent variable, namely aloe vera extract transdermal patch and the dependent variable, namely breast pain and engorgement. The instruments used are the Numeric Rating Scale (NRS) and the Six Point Engagement Scale (SPES). The Numeric Rating Scale (NRS) is a score to assess the level of pain in the swelling of the mother's breasts. The pain scale consists of 1-10. 1-3 indicates mild pain, 4-6 indicates moderate pain, and 7-10 indicates severe pain. On the validity test the NRS scale showed r = > 0.86 and the reliability test showed r = 0,96 and 0,95 respectively.(Pathak A et al., 2018).

Six Point Engorgement Scale (SPES) is a score to assess the level of breast swelling. Score 1 for the condition of the breast soft and there is no consistency in the breast, score 2 for the condition that there is little change in the breast with clear boundaries, score 3 for the condition of the breast that feels a lump with clear boundaries, hard but not painful, score 4 for the state of hard breasts starting to feel pain, a score of 5 for a hard and painful breast, a score of 6 for a hard and very painful part of the breast. The Six Point Engorgement Scale (SPES) has become a standard tool for assessing the occurrence of breast swelling from the second to the tenth day with a reliability value of (r=0,84).(Vladimir, 2015)

Data analysis

Univariate analysis applied here resulted the mean/median values of each of the variables studied and the distribution of respondents' characteristics. Bivariate analysis was used to determine the transdermal potency of aloe vera extract patches on reducing breast pain and engorgement scores in nursing mothers. It was found that the data were not normally distributed, so non-parametric tests were used, namely the Wilcoxon test and the Mann Withney test. as a non-parametric analysis because the data is not normally distributed and does not require data distribution assumptions. This analysis was carried out using a computer program, statistical test decisions using a significance degree of 95% and an error rate (α) = 5%. For the interpretation of the results, if the p value is an α value of 0.05, it can be concluded that H0 is accepted (no effect found).

RESULTS AND DISCUSSION

Characteristic of Respondents

The results showed that most of the respondents in the intervention and control groups consisted of primiparous women, 21 people (66,0%) and 11 people (34,0%) who were multiparous women. Based on age, it was shown that the respondents in the intervention and control groups were dominated by mothers aged 20-35 years, namely 29 people (91,0%), <20 years, 2 people (6,0%), and >35 years, 1 person (3,0%). Based on education level, the majority of respondents graduated from high school with 18 people (57,0%), undergraduate education level with 10 people (31,0%), junior high school education level with 2 people (6,0%), and elementary education level. as many as 2 people (6,0%). The results of the homogeneity of the two groups for parity, age and education variables obtained P-value> 0,05, meaning that there was no significant difference in the intervention group and the control group. So that the characteristics of the respondents in both groups are homogeneous or will not affect the results of the study.

Previous studies have stated that parity does not affect the occurrence of breast swelling.(Sari et al., 2019). Meanwhile, other studies have suggested that primiparas are more at risk of experiencing breast engorgement and breast tenderness due to breastfeeding experience and breast care. (Oktarida, 2023). Researchers have the assumption that the number of births cannot be used as a guideline, that only primiparous mothers experience breast engorgement and pain after giving birth but it is also found in multiparous mothers. This can be caused by several possibilities, such as the frequency of breastfeeding, the duration of breastfeeding, the baby's suction that is not strong,

nipple problems, or the wrong breastfeeding position which can also cause milk to collect or not come out so that the swelling pain can increase.

The age factor also affects breast swelling. Age 20-35 years is included in the adult age category. In this phase the average mother has a job. Working mothers will affect the frequency of breastfeeding to babies. This happens because the mother is tired or does not have enough time. It also affects the motivation of mothers to perform breast care. Lack of breast care can affect the incidence of breast swelling.(Maharani et al., 2018).

Mother's education is an important factor in breastfeeding. In this study, it was found that more than 50% of the respondents were mothers with a high school education level. Someone who has a high level of education will more easily receive information and apply it to everyday life. Great curiosity, and having the desire to seek experience will make it easier for the information obtained to become knowledge and apply it in their lives.(Mardjun et al., 2019).

Transdermal Potency of Aloe Vera Extract Patch for Reducing Breast Engorgement

Breast engorgement was measured by the breast engorgement scale or SPES (Six Point Engorgement Scale) in the intervention and control groups. After being given aloe vera extract patches and breastcare for 4 days, and statistically analyzed using the Mann Whitney test on the third day between the two groups, the p value = 0,001, which means that there is an effect of transdermal aloe vera extract patches on breast engorgement on the third day. The results showed that the mean difference in breast swelling in the intervention group was lower than that in the control group (3,63 in the intervention group and 4,50 in the control group).

The results of the analysis of breast swelling on the fourth day in both groups obtained a p value = 0,002, which means that there was an effect of transdermal patches of aloe vera extract on breast engorgement on the fourth day of the intervention. The mean value of breast engorgement in the intervention group was lower than that in the control group (the intervention group was 2,06 and the control group was 3,13). The results of this study revealed that the intervention of aloe vera extract patches on the third and fourth days was effective in preventing and reducing breast engorgement in postpartum and breastfeeding mothers.

Normality Test

In the current work, there are < 50 samples involved, so that the Shapiro-Wilk test was applied as selected normality test. If p > 0,05 then the data group is declared normally distributed. Based on normality results test, it was found that the data in the intervention group and the control group was not normally distributed, or p < 0,05, therefore the Mann Whitney and Wilcoxon statistical tests were used.

Table 1
Mean Change in Breast Engorgement Score

Variable	Group	Measurement	Mean±SD	ΔMean	Min-Max	*P-Value*
Breast Engorgement	Intervention	Post-test day 3	3,63±0,719	0,87	3-5	0,001
	Control		4,50±0,632		4-6	
	Intervention	Post-test day 4	2,06±0,854	1,07	1-4	0,002
	Control		3,13±0,806		2-4	

**Mann Whitney Test*

The lower average breast engorgement score in the intervention group was due to the use of aloe vera extract patches which contain flavonoids and tannins which are proven to have anti-

inflammatory effects and can reduce muscle tension. Aloe vera can also reduce oxygen free radicals produced by PMN's. The vitamin C in aloe vera helps inhibit inflammation, scavenging oxygen radicals to block the inflammatory process. Aloe vera is cooling and contains lignin which has a high absorption ability. The cold effect on aloe vera can increase comfort for mothers who experience swelling pain.(Hariana, 2015).

This study was supported by Silaban who proved that aloe vera was effective in significantly reducing breast engorgement and pain, with a p-value of 0,000 because aloe vera contains various anti-inflammatory substances, including salicylic acid, indomethacin, mannose 6-phosphate to reduce breast swelling in postnatal mothers partum (Silaban et al., 2022). The results of this study are in line with this study, where aloe vera compresses proved to be more effective than standard interventions in preventing breast engorgement in postpartum and breastfeeding mothers. Giving aloe vera extract patches done for three days or four days both have the effect of preventing and reducing breast engorgement (Silaban et al., 2022).

A study that compared aloe vera compresses as the intervention group and without aloe vera compresses as a control group found that the aloe vera intervention group was more significant in reducing breast engorgement compared to the control group. In this study, the average difference in pain before and after the intervention was 3,00000 and a p-value = 0,000 was obtained, while the decrease in breast engorgement in the control group without aloe vera compresses was 0,52941 and a p-value = 0,177 was obtained. It can be concluded that there was no difference in the intensity of breast engorgement pain before and after without giving aloe vera compresses.(Sari et al., 2019)

The results of the Wilcoxon test analysis obtained that the average post-test value of the intervention group on the fourth day was lower than the third day (2,06 on the fourth day and 3,63 on the third day), so that this could mean that the aloe vera extract patch intervention was more effective given for four days compared to only three days.

Table 2
Decreased Breast Engorgement Score

Variable	Group	Measurement	Mean±SD	ΔMean	Min-Max	*p-value*
Breast Engorgement	Intervention	Post-test I	3,63±0,719	1,57	3-5	0,000
	Intervention	Post-test II	2,06±0,854		1-4	
	Control	Post-test I	4,50±0,632	1,37	4-6	0,000
	Control	Post-test II	3,13±0,806		2-4	

** Post Hoc Wilcoxon Test*

Table 2 shows the difference in mean breast engorgement scores at the time of measurement in the post-test I and post-test II intervention groups, there was a decrease in the engorgement score of 2,06 in the intervention group and 3,13 in the control group, so that the decrease in breast engorgement was faster in the intervention group. The results above show a p value = 0,000 in the intervention group, and there was an average decrease in the engorgement score after four days of treatment, which means that transdermal patches of aloe vera extract were effective for four days. In the control group, a p value = 0,000 was obtained and there was an average decrease in the engorgement score after four days of treatment so that breastcare was more effective for four days.

Transdermal Potency of Aloe Vera Extract Patch for Reducing Pain

Breast pain was measured using the NRS (Numeratic Rating Scale). The results of the analysis after intervention were given on the third day between the two groups using the Mann Whitney test. The results obtained were p value = 0,001, which means that there was an effect of transdermal patches of aloe vera extract on the breast pain score on the first day. third. The results showed that the mean

difference in breast pain in the intervention group was lower than that in the control group (3,31 in the intervention group and 4,56 in the control group).

The results of the analysis of breast pain scores on the fourth day between the two groups obtained a p value = 0,001, which means that there was an effect of transdermal patches of aloe vera extract on breast pain scores on the fourth day after the intervention. The mean score of breast pain in the intervention group was lower than the control group (1,87 for the intervention group and 3,25 for the control group).

Previous research on the effect of aloe vera on breast pain found that aloe vera compresses and breastcare were effective in reducing pain due to breast engorgement p value = 0,001. The average decrease in the aloe vera and breastcare intervention group was higher when compared to the average breastcare group (2,0 in the intervention group and 2,9 in the control group) (Febriyanti et al., 2021). Previous research on the effects of aloe vera compared to cabbage found that aloe vera compresses and cabbage compresses were effective for reducing engorgement pain, but most respondents were more comfortable using aloe vera compresses compared to cabbage compresses because they had to be used directly (Patiran et al., 2022).

This study was supported by Sari who proved that aloe vera was effective in significantly reducing swelling and pain with a p value of 0,000 in 34 postpartum women with breast engorgement.(Sari et al., 2019). In addition, Widianti conducted research on postpartum mothers with breast engorgement and found that using aloe vera can reduce pain and engorgement in the breasts, then aloe vera also makes mothers feel more comfortable (Ramia, 2022). The results of this study indicate that aloe vera extract patches and breastcare are proven to be more effective than standard breastcare interventions alone in preventing breast pain in postpartum women.

Normality Test

In the current work, there are < 50 samples involved, so that the Shapiro-Wilk test was applied as selected normality test. If p > 0,05 then the data group is declared normally distributed. Based on normality results test, it was found that the data in the intervention group and the control group was not normally distributed, or p < 0,05, therefore the Mann Whitney and Wilcoxon statistical tests were used.

Table 3
Differences in Breast Pain in the Intervention and Control Groups

Variable	Group	Measurement	Mean±SD	ΔMean	Min-Max	*P-Value*
Pain	Intervention	Post-test	3,31 ± 0,946	1,25	2-5	0,001
	Control	Day 3	4,56 ± 0,814		3-6	
	Intervention	Post-test	1,87±1,088	1,38	0-3	0,001
	Control	Day 4	3,25±0,856		2-5	

**Mann Whitney Test*

Transdermal treatment of aloe vera extract patches in this study was carried out twice a day for four consecutive days. The results of calculations using the Wilcoxon test, the average breast pain score in the intervention group on the fourth day was lower when compared to the mean of the intervention group on the third day (1,87 on the fourth day and 3,31 on the third day), which means that the intervention was given a transdermal patch Aloe vera extract was more effective given for four days than three days.

Table 4
Differences in Decreasing Pain Scores Between Measurement Times

Variabel	Group	Measurement	Mean±SD	ΔMean	Min-Max	*P-Value*

Pain	Intervention	Post-test I	3,31±0,946	1,44	2-5	0,000
	Intervention	Post-test II	1,87±1,088		0-3	
	Control	Post-test I	4,56±0,814	1,31	3-6	0,001
	Control	Post-test II	3,25±0,856		2-5	

** Post Hoc Wilcoxon Test*

Aloe vera extract patches are effective for preventing breast pain because aloe vera contains flavonoids and tannins which have anti-inflammatory and astringent or sedative functions, thereby reducing pain. Inflammation or inflammation is the body's defense mechanism and is an immune response used to fight infection (Dhanik et al., 2017).

Aloe vera contains anthraquinone compounds, aloe emodin, bradykinase enzymes, carboxypeptidase, salicylates, flavonoids, tannins and saponins which have anti-pain and anti-inflammatory properties. 81 Aloe vera is cold and contains lignin which has a high absorption ability. The cold effect on aloe vera can increase comfort for mothers who experience engorgement pain (Hariana, 2015). Another effect of aloe vera is that the gel can heal wounds and other skin trauma. Likewise to reduce pain at the site of visible trauma with the use of this drug. The moisturizing effect of aloe vera has been well proven in the form of topical products.(Novyana & Susianti, 2016).

Aloe vera can keep the skin moist, so the skin doesn't get dry, wrinkled, or flaky easily. This is because in aloe vera gel there is a lignin substance which has the effect of providing moisture to the skin. Aloe vera contains a lot of water and various substances that can reduce pain so that the pain you feel will be reduced.(Tim Agro Mandiri, 2016).

Aloe vera has also been shown to contain prostaglandins and bradykinin hydrolysis which function to relieve pain and inflammation. The content of vitamins including carotene, Vit E, Vit C, and B complex play a role in cell reactions, function as antioxidants, and contain anthraquinone compounds that have antibacterial abilities.(Sikumbang et al., 2020).

In this study, aloe vera was made more practical into a patch so that its application was easy and practical when it was administered twice a day for four consecutive days. This is in accordance with the initial hypothesis that aloe vera extract patches are effective in reducing breast pain in postpartum women.

Based on the description above, it can be explained that the aloe vera extract transdermal patch has proven effective in reducing breast pain and engorgement in nursing mothers. The group of postpartum women who received aloe vera extract transdermal patch intervention and breastcare 2 times a day for 4 consecutive days with a duration of 2 hours had significantly lower pain and engorgement scores compared to the control group.

This is influenced by the content of flavonoids and tannins which are anti-inflammatory and astringent so that they can reduce breast pain and engorgement in nursing mothers. Contains flavonoids and tannins which help reduce breast pain and engorgement in nursing mothers. Flavonoid compounds can inhibit lipid peroxidation and suppress tissue damage by free radicals. The pharmacological activity of the flavonoids that occur are anti-inflammatory, pain-relieving, and antioxidant. While tannins are polyphenolic compounds that act as antibacterials, they can build protein complexity and hydrophobic relationships. Tannins also act as antibacterial and astringent with their mechanism of action destroying the bacterial cell wall.

LIMITATION OF THE STUDY

The researcher realizes that there are limitations in this study, including that researchers have not found all the factors that can be an obstacle to breast engorgement, such as the type of delivery,

breast problems, the mother experiencing stress, pain in the baby and baby sucking. Researchers have not carried out toxicity tests, longevity tests (expired) on aloe vera extract patch preparations, patch sizes that are still uniform or have not followed the size of the respondent's breasts, researchers have not included the production date and composition of the aloe vera extract patches.

CONCLUSIONS AND SUGGESTIONS

The use of aloe vera extract transdermal patches and breastcare in nursing mothers with breast swelling, 2 times a day for 4 consecutive days has more potential in reducing breast pain and engorgement in nursing mothers compared to giving breastcare alone. This is influenced by the content of flavonoids and tannins which are anti-inflammatory and astringent so that they can reduce breast pain and swelling in nursing mothers, so it can be concluded that aloe vera extract transdermal patches are useful as an effective non-pharmacological alternative in reducing breast pain and engorgement in nursing mothers.

For health services transdermal treatment of aloe vera extract patches can be used as a non-pharmacological alternative in reducing pain and breast engorgement in nursing mothers. Future researchers are expected to conducting research related to breast pain and swelling using other non-pharmacological therapies so as to expand the information for the community especially postpartum and breastfeeding mothers.

ETHICAL CONSIDERATIONS

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Conflict of Interest

No conflict of interest that is directly or indirectly related to the current article was found.

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