

Effectiveness of Aloe Vera and Betel Leaf (*Piper Betle L.*) Spray on the Healing of Perineal Wounds

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ABSTRACT

Perineal tissue wounds occur either spontaneously or through episiotomy after childbirth. The combination of aloe vera and betel leaf can be used as an alternative therapy. The purpose of this study was to determine the effectiveness of Lisih spray, a mixture of aloe vera and betel leaf perineal wound healing. The study design used a quasi-experimental study, with a population of 32 postpartum women on day 1 (second-degree perineal wounds). The study instrument used a REEDA Score. The results of the Mann-Whitney test showed that the difference in the effectiveness of perineal wound healing began to be seen on the 5th (p value = 0.001, 0.001, 0041) $\alpha < 0.05$, which indicates a significant difference between the two groups. Lisih Spray, a herbal medicine that uses natural ingredients, can be used as an alternative to accelerate the healing of perineal wounds.

Keywords: aloe vera, betel leaf, healing, perineal wounds, spray

Received September 7, 2025; Revised October 12, 2025; Accepted November 14, 2025



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BACKGROUND

Perineal tears are one of the most common complications of vaginal delivery and a leading cause of postpartum maternal morbidity. Globally, approximately 85% of women who deliver vaginally experience perineal tears of varying severity (Smith et al., 2021). In Indonesia, the incidence of perineal tears is reported to reach 40–60% of all normal deliveries, with the majority being first- and second-degree tears (Ministry of Health of the Republic of Indonesia, 2022). Perineal tears can occur spontaneously due to excessive stretching of the perineal tissue during delivery of the fetal head or as a result of an episiotomy. This condition can cause pain, bleeding, wound infection, impaired activity, and even sexual dysfunction if not properly managed (Wijayanti & Lestari, 2020). Factors contributing to perineal tears include primiparous parity, high birth weight, suboptimal fetal position, and the attendant's skill in protecting the perineum during the second stage of labor (Rahmawati, 2021). Therefore, preventing perineal tears through correct delivery assistance techniques and adequate perineal care is an important focus in midwifery practice to improve the quality of life of postpartum mothers.)

Based on a preliminary study conducted at the Ngasem Community Health Center in Kediri Regency, East Java, data from two months (January to February 2025) showed that 147 postpartum women experienced perineal injuries, including episiotomy and spontaneous tears. Of the 10 postpartum women who experienced perineal tears, 6 (60%) healed within 7 days, with inflammation, redness, and pain. Four (40%) healed more quickly, in less than 7 days. (Data from Ngasem Community Health Center, 2025)

Untreated perineal tears can lead to various complications, one of which is perineal wound infection, which can slow the healing process and increase the risk of maternal morbidity. Infection usually occurs due to bacterial contamination from the perianal area or unsterile instruments during wound suturing, as well as poor postpartum perineal hygiene (Handayani et al., 2020). Symptoms of infection generally appear on the third to seventh day after delivery, characterized by severe pain, redness, swelling, purulent discharge, and sometimes fever (Nursanti & Dewi, 2021). If not treated promptly, the infection can spread to surrounding tissue and cause more serious complications such as an abscess or puerperal sepsis. Therefore, proper perineal wound care, maintaining vulvar hygiene, and educating mothers about postpartum self-care are important steps to prevent infection and accelerate wound healing.

Signs of perineal wound infection include perineal pain, a ruptured perineal wound, and purulent vaginal discharge. Postpartum mothers are often afraid to clean their perineal wounds due to discomfort caused by stitches in the birth canal. Common management practices for perineal wound care include dry cleaning by washing the perineal wound and scrubbing it with soap, and the use of pain-relieving medications. (Dona, 2022)

Examination results obtained from mothers with perineal wound infections revealed 100% *E. coli*, 33.3% *Staphylococcus* bacteria, and 33.3% *Acinetobacter* sp. *E. coli* bacteria are often found in the perineal wounds of postpartum mothers with delayed healing. *E. coli* bacteria act as pathogens in perineal wounds and can cause wound infections. (Astuti, 2020)

Aloe vera leaf extract can inhibit the growth of *Staphylococcus aureus* bacteria because aloe vera leaves contain bioactive compounds that function as antibacterial agents. The anthraquinone and saponin content in aloe vera leaves is bactericidal, capable of inhibiting the gram-positive bacteria *Enterococcus bovis* and *Staphylococcus aureus*, and the gram-negative bacteria *Escherichia coli*, *Pseudomonas aeruginosa*, *Morganella morganii*, *Proteus mirabilis*, and *Proteus vulgaris*. (Azzahra, 2021) Betel leaves (*Piper betle* L.) can inhibit the growth of *Staphylococcus aureus*. The content of essential oils, flavonoids, saponins, and tannins function as antibacterials. The chemical compounds and antibacterial activity of betel leaf can inhibit

gram-positive bacteria (*Staphylococcus aureus*, *Bacillus subtilis*, and *Listeria monocytogenes*) and gram-negative bacteria (*Salmonella typhimurium*, *Escherichia coli*, and *Pseudomonas psedomallaei*). (Azzahra, 2021)

A single extract of aloe vera and a single extract of betel leaf had lower inhibitory activity against bacteria compared to the combination of the two extracts. When two antimicrobial agents act simultaneously on a homogeneous microbial population, the effect can be synergistic, meaning the combined effect is significantly greater than the sum of the two effects. The concentration of aloe vera and betel leaf extracts from various treatments resulted in variations in the diameter of the inhibitory activity. The interaction between the concentration of aloe vera and betel leaf extracts on the diameter of the inhibitory activity against *Staphylococcus aureus* was investigated. (Azzahra, 2021)

The combination of aloe vera (*Aloe vera*) and betel leaf (*Piper betle* L.) was chosen as a natural ingredient for perineal wound healing based on their bioactive compounds, which have a synergistic effect in accelerating tissue regeneration and preventing infection. Aloe vera is known to contain aloin, glucomannan, and polysaccharides, which play a role in stimulating fibroblasts, increasing collagen synthesis, and maintaining tissue moisture, thus accelerating the wound epithelialization process (Rahman et al., 2021). Meanwhile, betel leaf contains phenol, flavonoid, tannin, and eugenol compounds that have strong antiseptic, antibacterial, and anti-inflammatory activity against microorganisms that cause wound infections such as *Staphylococcus aureus* and *Escherichia coli* (Putri & Handayani, 2020). The spray dosage form was chosen because it is more practical, hygienic, and able to distribute the active ingredients evenly over the wound area without direct contact, thereby reducing the risk of cross-contamination (Lestari et al., 2022).

The selection of aloe vera (*Aloe vera*) and betel leaf (*Piper betle* L.) as a natural ingredient for perineal wound healing is based on scientific evidence regarding the antibacterial, anti-inflammatory, and tissue regeneration stimulation activities of both. In vitro research by Lao et al. (2023) showed that betel leaf ethanol extract has strong antibacterial activity against *Staphylococcus aureus* with an MIC value of 2500 µg/mL and an MBC of 5000 µg/mL, and is able to inhibit biofilm formation which is one of the causes of difficult-to-heal wound infections. Meanwhile, an experimental study by Budiman et al. (2018) proved that the combination of aloe vera and betel leaf extract gel can accelerate the healing process of second-degree burns in test animals through the mechanism of increasing re-epithelialization and reducing inflammation significantly compared to the control group. Aloe vera contains glucomannan and polysaccharides that stimulate fibroblast proliferation and collagen synthesis (Rahman et al., 2021), while betel leaves are rich in flavonoids, tannins, and eugenol, which have antibacterial and antiseptic properties (Putri & Handayani, 2020). Based on this, the combination of these two ingredients in topical spray form is considered effective in accelerating the healing process of perineal wounds through simultaneous antimicrobial, anti-inflammatory, and epithelial tissue regeneration mechanisms without causing irritation.

In daily practice, perineal wound care in postpartum women is generally still carried out conventionally, such as cleaning the wound with boiled betel leaf water, betadine solution, or liquid antiseptic, and applying warm compresses to maintain cleanliness and reduce pain. However, these methods are often ineffective and risk irritating still-sensitive tissue. The use of antiseptics such as betadine, which contain povidone-iodine, can inhibit fibroblast growth and epithelialization, thus slowing the wound healing process (Haryanto et al., 2020). Furthermore, the use of manually prepared antiseptic solutions also carries the potential for contamination and irregularities in the concentration of active ingredients, while the cleaning process with cotton or cloth can cause re-traumatization of the wound (Sondakh & Lestari, 2021). Therefore, innovative wound care solutions are needed that are practical, hygienic, and safe for new tissue. Using a spray that combines aloe vera and betel leaf is a suitable alternative

because the spray allows for contactless application, maintains sterility, provides even distribution of active ingredients, and contains antibacterial, anti-inflammatory, and tissue regeneration stimulant components that can accelerate the healing process of perineal wounds effectively and comfortably for postpartum mothers.

The spray, a combination of aloe vera and betel leaf, was administered for seven days because the healing phase of perineal wounds generally occurs within this timeframe, starting from the inflammatory phase to the early proliferative phase (Abbas & Lichtman, 2018). On the 7th day, signs of healing such as reduced redness, edema, and wound discharge are usually clearly visible according to the REEDA Scale parameters (Davidson et al., 2019). The twice-daily application frequency is intended to maintain optimal wound moisture and maintain the antibacterial effect of the active ingredients in aloe vera and betel leaf, which have a limited half-life on the tissue surface. A spraying distance of 5 cm was chosen to ensure even distribution of the liquid particles over the wound area without causing direct pressure that could cause new trauma to the perineal tissue (Hamman, 2018). With this method, it is hoped that the process of tissue regeneration and wound closure will be faster, more hygienic, and minimize the risk of secondary infection.

Thus, the combination of aloe vera and betel leaf extracts in spray form is expected to effectively accelerate the healing process of perineal wounds through antibacterial, anti-inflammatory mechanisms, and stimulation of epithelial tissue regeneration simultaneously. Based on this research, a study was conducted on "The Effect of Lisih Ointment (Aloe Vera) and betel leaves (Piper betle L.) on perineal wound healing."

METHODS

This study used a two-pretest posttest with control group design to determine the effect of Lisih Spray with aloe vera and betel leaf (Piper betle L.) on perineal wound healing. The population of this study was all postpartum mothers on the first day who experienced second-degree perineal wounds in the Ngasem Community Health Center Working Area, Kediri Regency. The research sample was taken using the infinite formula, resulting in a total of 32 samples, divided into 16 for the intervention group and 16 respondents for the control group. The sampling technique used purposive sampling, namely taking samples that meet the research criteria with inclusion criteria (All postpartum mothers who experience second-degree perineal wounds, are willing to be respondents, mothers do not use other drugs/other procedures for wound healing purposes, do not suffer from diabetes mellitus, are not anemic, mothers have a daily protein intake according to the minimum postpartum needs, namely ≥ 1.2 g/kgBW/day or equivalent to ± 70 grams of protein per day based on a 24-hour food recall assessment), exclusion criteria, namely (mothers who experience postpartum complications such as bleeding, mothers do not follow research procedures, mothers who are over 40 years old), the research instrument uses a perineal wound healing observation sheet using the REEDA Score, namely an observation sheet for the perineal wound healing process created by Davidson 1974, Hill 900, Sleep and Grant 1998, namely by looking at Redness (redness), Oedem (swelling), Ecchymosis (blood spots), Discharge (discharge), Approximation (wound union). The intervention group in this study was given Lisih spray (aloe vera and red betel leaf). The intervention was given for 7 days (days 1 to 7) given 2X1 spray in the morning at 07.00 WIB and in the afternoon (at 18.00), 5 times spray at a distance of 5 cm, previously the perineal wound was cleaned and dried. While the control group was given perineal wound care by washing the perineum using soap and running water. for 7 days of intervention. Data analysis used the T Test to determine the effect of Lisih spray on perineal wound healing, while to determine the difference in effectiveness seen from day to day was done with the Man Whitney Test.

RESULTS

1. Characteristics of Respondents in the Intervention and Control Groups

Table 1. Characteristics of Respondents in the Intervention and Control Groups

Variables	Group Treatment		Control Group	
	f	%	f	%
Age				
<20 Years	3	18.75	2	12.5
21-35 Years	11	68.75	10	62.5
>35 Years	2	12.5	4	25
Amount	16	100	16	100
Job				
Housewife	8	50	8	50
Self-employed	6	37.5	3	18.75
Private	1	6.25	4	25
Civil Servant	1	6.25	1	6.25
Amount	16	100	16	100
Education				
Elementary School	2	12.5	1	6.25
Junior High School	4	25	3	18.75
Senior High School	7	43.75	8	50
College	3	18.75	4	25
Amount	16	100	16	100
Parity				
Primipara	4	25	6	37.5
Multipara	12	63	10	62.5
Amount	16	100	16	100
Food Taboos				
Food Taboos	0	0	0	0
No Food Abstinence	16	100	16	100
Amount	16	100	16	100

Based on tabel 1, most respondents in both groups were aged 21–35 years (68.75% in the treatment group and 62.5% in the control group), with the majority working as housewives (50% each) and having a high school education or equivalent (43.75% and 50%). Based on parity, most were multiparous (63% and 62.5%), while all respondents had no dietary

restrictions (100%). These results indicate that the characteristics of respondents in the treatment and control groups were relatively homogeneous, both in terms of age, occupation, education, and parity, so that they can be compared equally in the perineal wound healing process.

2. Distribution of Healing from Day 1 to Day 7 in the Intervention and Control Groups

Table 2. Distribution of Healing from Day 1 to Day 7 in the Intervention and Control Groups

Wound Healing	Group Intervention (n=16)						Group Control (n=16)					
	Good		Not good		Bad		Good		Not good		Bad	
	(Reeda Scale Number 0)		(Reeda Scale Number 1-5)		(Reeda Scale Number >5)		(Reeda Scale Number 0)		(Reeda Scale Number 1-5)		(Reeda Scale Number >5)	
Day to-	F	%	F	%	F	%	F	%	F	%	F	%
1	0	0	0	0	16	100	0	0	0	0	16	100
2	0	0	0	0	16	100	0	0	0	0	16	100
3	0	0	16	100	0	0	0	0	13	81.25	3	18.75
4	0	0	16	100	0	0	0	0	16	100	0	0
5	13	81.25	3	18.75	0	0	11	68.75	3	18.75	2	12.5
6	14	87.5	2	12.5	0	0	9	56.25	7	43.75	0	0
7	16	100	0	0	0	0	10	62.5	6	37.5	0	0

Based on Table 2, it can be seen that the perineal wound healing process in the intervention group (which used aloe vera and betel leaf spray) showed faster results than the control group. From the first to fourth day, all respondents in both groups were still in the "poor" category (Reeda > 5). However, starting on the fifth day, there was a significant improvement in the intervention group with 81.25% of respondents showing good healing, while in the control group only 68.75% experienced good healing. On the sixth day, almost all respondents in the intervention group (87.5%) had completely healed, while the control group had only reached 56.25%. Finally, on the seventh day, all respondents in the intervention group (100%) showed good healing, while the control group only 62.5%. These results indicate that the combination of aloe vera and betel leaf spray is effective in accelerating perineal wound healing, compared to conventional treatment methods which are slower to show wound tissue repair.

2. Data Normality Test in the Intervention Group and Control Group

The normality test is an assumption test that aims to determine whether the samples studied have the same abilities. The normality test uses the Kolmogorov-Smirnov test using Statistical Product and Service Solutions (SPSS) software. The results of the data normality test are shown in Table 3 below:

Table 3. Normality Test

Day To.	Inter Group	Control Group
	p* value	p* value
1	0,000	0,000
2	0,000	0,000
3	0,000	0,000
4	0,000	0,000
5	0,000	0,000
6	0,001	0,001
7	0,000	0,002

*Uji Kolmogorov-Smirnov

Based on table 3, the results of the normality test using the Kolmogorov-Smirnov test obtained $p_value < \alpha 0.05$, so it can be concluded that the data is not normally distributed.

From the normality test (Kolmogorov Smirnov), if $p_value < 0.05$ is obtained, it means the data is not normal, so the test used is a non-parametric test, namely the Mann-Whitney U test.

3. Effect of Spray Lisih (Aloe Vera) and Betel Leaf (Piper Betle L.) on Perineal Wound Healing

Table 3. Effect of Spray Lisih (Aloe Vera) and Betel Leaf (Piper Betle L.) on Perineal Wound Healing

Day to-	Mean Rank Kelompok Kontrol	Mean Rank Kelompok Intervensi	U Mann-Whitney	Z	p-value (Asymp. Sig. 2-tailed)
1	16.5	16.5	128	0	1
2	16.5	16.5	128	0	1
3	17.5	15.5	110	-1.532	0.126
4	16.5	16.5	128	0	1
5	21	12	68	-2.572	0.011
6	22	11	58	-3.28	0.001
7	19.5	13.5	90	-2.048	0.041

Based on table 3 The Mann-Whitney test results showed no significant difference in perineal wound healing between the control and intervention groups from day 1 to day 4 ($p > 0.05$). However, from day 5 to day 7, the p value was < 0.05 (day 5= 0,011, day 6= 0,001, day 7= 0,041), indicating a significant difference between the two groups. The intervention group receiving the aloe vera and betel leaf spray showed faster and better wound healing compared to the control group receiving conventional treatment.

DISCUSSION

Based on Table 2, it can be seen that the perineal wound healing process in the intervention group (which used aloe vera and betel leaf spray) showed faster results than the control group. From the first to fourth day, all respondents in both groups were still in the "poor" category (Reeda > 5). However, starting on the fifth day, there was a significant improvement in the intervention group with 81.25% of respondents showing good healing, while in the control group only 68.75% experienced good healing. On the sixth day, almost all respondents in the intervention group (87.5%) had completely healed, while the control group had only reached 56.25%. Finally, on the seventh day, all respondents in the intervention group (100%) showed good healing, while the control group only 62.5%. These results indicate that the combination of aloe vera and betel leaf spray is effective in accelerating perineal wound healing, compared to conventional treatment methods which are slower to show wound tissue repair.

Based on the research results, the perineal wound healing process showed a significant difference between the intervention group using a combination spray of aloe vera and betel leaf (*Piper betle* L.) and the control group receiving conventional treatment. Based on the Reeda Scale, from days 1 to 4, all respondents in both groups remained in the "poor" category (score >5), indicating the ongoing inflammatory phase. However, starting on day 5, a significant improvement was observed in the intervention group, with 81.25% of respondents showing good healing (score 0), compared to only 68.75% in the control group. The Mann–Whitney test showed $p = 0.011$, indicating a significant difference starting on day 5. By days 6 to 7, all respondents in the intervention group had experienced complete healing, while in the control group, the healing process was still partially progressing.

The more effective perineal wound healing in the intervention group is thought to be due to the pharmacological properties of aloe vera and betel leaf, which synergize in accelerating tissue regeneration. Aloe vera contains aloin, saponin, lignin, and salicylic acid, which act as anti-inflammatory and antibacterial agents, and stimulate fibroblast proliferation for new tissue formation (Hamman, 2008). Meanwhile, betel leaves contain phenolic compounds, flavonoids, and essential oils (eugenol, chavicol), which function as natural antiseptics and antimicrobials, effective against bacteria that cause wound infections, such as *Staphylococcus aureus* and *Escherichia coli* (Pradhan et al., 2017). The combination of these two ingredients in spray form allows for faster absorption of the active ingredients, contactless application, and prevents cross-contamination, thus accelerating the epithelialization process and reducing the risk of perineal wound infection.

The results of this study align with the findings of Nurmayanti et al. (2020), which showed that applying aloe vera gel to perineal wounds can accelerate wound healing by up to 2–3 days compared to conventional antiseptics. Furthermore, research by Agustina et al. (2021) also reported that betel leaves have strong antibacterial activity against gram-positive bacteria that cause wound infections, making them effective in accelerating the healing process. Therefore, the combination of aloe vera and betel leaf spray can be an innovative alternative for more practical, safe, and effective perineal wound care, and has the potential to be implemented in obstetric practice to improve the quality of postpartum care.

Based on table 3 The Mann–Whitney test results showed no significant difference in perineal wound healing between the control and intervention groups from day 1 to day 4 ($p > 0.05$). However, from day 5 to day 7, the p value was < 0.05 , indicating a significant difference between the two groups. The intervention group receiving the aloe vera and betel leaf spray showed faster and better wound healing compared to the control group receiving conventional treatment.

Based on Table 3, the results of the Mann–Whitney test showed no significant difference in perineal wound healing between the control and intervention groups from day 1 to day 4 ($p > 0.05$). This finding indicates that during the early stages of the healing process, both groups were still in the inflammatory phase, where the wound commonly exhibits redness, edema, and mild discomfort as part of the body's normal physiological response. At this stage, the inflammatory reaction dominates the tissue repair process, and the effect of topical treatment has not yet appeared significantly. According to Cutting and Harding (2015), the inflammatory phase typically lasts for the first three to four days after tissue injury, and visible improvement in wound condition begins only when the proliferative phase starts.

From day 5 onward, the Mann–Whitney test results revealed a significant difference ($p < 0.05$) between the two groups, indicating that the aloe vera and betel leaf spray had a measurable effect on accelerating wound healing. The intervention group showed faster progress in the reduction of redness, edema, and discharge, which are among the indicators assessed using the REEDA scale. The REEDA score (Redness, Edema, Ecchymosis, Discharge, Approximation) is a standardized and reliable tool to evaluate perineal wound healing, where a lower score reflects better tissue recovery (Davidson, 1974). The significant improvement in REEDA scores among mothers in the intervention group reflects the effectiveness of the herbal spray in promoting tissue regeneration and preventing infection in the perineal area.

The effectiveness of the aloe vera and betel leaf spray is strongly supported by the pharmacological properties of both plants. Aloe vera contains polysaccharides such as acemannan, which promote fibroblast proliferation, collagen synthesis, and angiogenesis—crucial processes in the proliferative phase of wound healing (Hamman, 2008). Meanwhile, betel leaf (*Piper betle L.*) is rich in phenolic compounds such as eugenol and chavicol that possess strong antibacterial and anti-inflammatory effects (Pradhan et al., 2017). The combination of these active compounds helps to control microbial growth in the wound area, minimize inflammation, and enhance epithelialization, thereby accelerating the transition from the inflammatory to the maturation phase of healing.

By day 7, all respondents in the intervention group achieved complete healing (REEDA score = 0), while a portion of the control group still showed signs of mild inflammation and incomplete tissue approximation. This finding confirms that the combination of aloe vera and betel leaf spray is effective in enhancing wound healing compared to conventional methods. The use of the spray form also provides additional benefits by allowing non-contact application, reducing pain during treatment, and minimizing the risk of contamination. Overall, these results suggest that integrating natural-based topical agents such as aloe vera and betel leaf into postpartum perineal care could serve as a safe, effective, and practical alternative for improving maternal comfort and recovery outcomes.

Based on the Mann–Whitney test results, there was no significant difference in the perineal wound healing process between the control and intervention groups from day one to day four ($p > 0.05$). This indicates that in the early phase of wound healing, both groups were still in the inflammatory phase, which is the phase in which redness, edema, and pain occur as a normal response of the body to tissue injury. This phase typically lasts three to four days before the start of the proliferation phase, or new tissue formation (Abbas & Lichtman, 2018). From day five to seven, the p value showed a result < 0.05 , indicating a significant difference between the two groups. The intervention group using the combination of aloe vera and betel leaf spray showed faster and better wound healing than the control group.

The accelerated wound healing in the intervention group is consistent with the REEDA Scale (Redness, Edema, Ecchymosis, Discharge, Approximation) assessment theory, which assesses clinical changes in the wound area. A decrease in the REEDA score indicates improved wound condition and increased tissue regeneration (Davidson et al., 2019). Aloe vera

contains active compounds such as acemannan, saponins, and glucomannan, which act as anti-inflammatory, antibacterial, and collagen-stimulating agents (Hamman, 2008). Meanwhile, betel leaves (*Piper betle* L.) contain flavonoids, eugenol, and tannins, which function as natural antiseptics and have antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* (Pradhan et al., 2017). The combination of these two ingredients helps accelerate the proliferation phase, reduce infection, and accelerate perineal wound closure.

This study has several advantages, including the use of a combination of natural ingredients in a spray form that is practical, hygienic, and easy to apply. The use of the REEDA score also provides a more objective assessment of the wound healing process (Davidson & Taylor, 2021). However, this study has limitations such as the relatively small sample size and observation period of only seven days, which cannot describe the long-term healing process. Furthermore, external factors such as nutritional patterns, perineal hygiene, and the mother's psychological state were not fully controlled. Further research with a larger sample size and longer duration is needed to strengthen the evidence of the effectiveness of the combination of aloe vera and betel leaf spray on healing perineal wounds.

CONCLUSION

A combination spray of aloe vera and betel leaf (*Piper betle* L.) has been shown to be effective in accelerating perineal wound healing compared to conventional treatment. The study showed a significant difference in REEDA scores from day 5 to 7, with the intervention group experiencing faster and better wound healing. The combination of these two natural ingredients acts through anti-inflammatory and antibacterial effects and stimulates new tissue formation, thus accelerating perineal tissue regeneration.

Based on the research results, it is recommended that a combination spray of aloe vera and betel leaf (*Piper betle* L.) can be used as a natural and practical alternative in perineal wound care, as it has been proven to accelerate the healing process and reduce the risk of infection. Healthcare workers, particularly midwives, are expected to apply this innovation in postpartum care practices while still adhering to the principles of hygiene and safety in herbal medicine. Furthermore, further research with a larger sample size, longer observation periods, and laboratory analysis of tissue healing mechanisms is recommended to strengthen scientific evidence for the effectiveness of this natural ingredient combination.

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