

EFFECTIVENESS OF BANGLE RHIZOME EXTRACT GEL SPRAY (ZINGIBER PURPUREUM ROXB.) ON HEALING PERINEAL WOUNDS IN POSTPARTUM MOTHERS

Sri Wahyu Aritonang^{1*}, Suryati Kumorowulan², Sri Sumarni³

¹⁻³Magister Applied Midwifery, Health Polytechnic
Of Semarang, Indonesia

Email Korespondensi: sriwahyuaritonang25@gmail.com

Disubmit: 23 Juli 2025

Diterima: 26 Maret 2026

Diterbitkan: 01 April 2026

Doi: <https://doi.org/10.33024/mahesa.v6i4.21788>

ABSTRACT

Childbirth is a physiological process that lead to complications such as perineal lacerations. One alternative to accelerate perineal wound healing is the use of a spray gel bangle rhizome (*zingiber purpureum roxb*), which has regenerative, antibacterial, anti-inflammatory and antioxidant properties. To determine the effectiveness of bangle rhizome extract spray gel in accelerating perineal wound healing in postpartum mothers. This quantitative study used a True Experimental with a pre-test and post-test control group. A sample of 36 postpartum mothers with second-degree perineal lacerations were divided into two groups: intervention group (bangle rhizome extract gel spray) and control group (dry cleaning treatment). The sampling was conducted using randomized sampling. Analysis used the Generalized Linear Model- Repeated Measures (GLM-RM). The bangle rhizome extract gel spray applied twice daily for 7 days was effective in accelerating perineal wound healing. The GLM-RM test showed a significant decrease REEDA scores in the intervention group ($p=0.000<0.050$), while the control group only experienced a decrease in the posttest on day 7. Bangle rhizome extract gel spray given twice daily for 7 days is effective in accelerating perineal wound healing in postpartum mothers based on REEDA scores.

Keywords: Bangle Rhizome Extract Gel Spray, Perineal Wound, Postpartum Mothers.

INTRODUCTION

Although childbirth is a natural physiological event, it can still result in complications. One of the most frequent issues is perineal tearing, which may happen spontaneously or as a result episiotomy. Perineal injuries are classified into four degrees based on their severity. First-degree tears are superficial, affecting only the vaginal lining and perineal skin, and usually do not require stitches. Second-degree tears extend deeper, involving the muscles

beneath the skin, and typically need suturing to support proper healing. Third-degree tears reach the external anal sphincter, while fourth-degree injuries are the most severe, involving damage to the vaginal lining, perineal muscles, anal sphincter, and rectal mucosa (Simarmata, 2022). Effective wound care for mothers with perineal tears is essential to minimize pain, promote faster healing, and prevent

infection (Isfaroh & Cobalt Anglo, 2023).

In Indonesia, approximately 2.7 million women have experienced perineal tears during childbirth, and this figure is projected to rise to 6.3 million by 2050. In the United States, perineal lacerations affect around 40% of the 26 million women giving birth. Similarly, this issue poses a major concern in Asian populations, where the incidence of perineal rupture is estimated to be as high as 50% (Silaban, 2024).

Perineal tears continue to be a prevalent maternal health concern in Indonesia. In North Sumatra, the maternal mortality rate (MMR) has risen to 202 per 100,000 live births, showing an increase compared to the previous year (North Sumatra Provincial Health Office, 2023). In Medan City, the maternal mortality rate (MMR) is recorded at 75 per 100,000 live births. The leading causes of maternal deaths are hemorrhage, the pregnancy-related complications and infections. (Medan City Health Profile, 2023). If perineal wounds are not properly treated, they are at risk of becoming infected by pathogenic bacteria, such as anaerobic *Streptococcus*. These infections can spread to the urinary and reproductive tracts, potentially leading to serious complications (Rusana, E., Lasria, S., Henny, R., dan Lidia, 2024).

Worldwide, over 85% postpartum women are reported to experience perineal trauma. The infections during postpartum period primarily due to birth canal injuries affect approximately 22% to 55% of cases, while injuries involving the anal sphincter occur in about 0.5% to 7% of women. In Southeast Asia, the incidence perineal wound infections is estimated at 11.84%, with many postpartum mothers requiring hospitalization due to infections and

lacerations in birth canal. (Lestari, A., dan Nur, 2024).

Several factors influence the healing process of perineal wounds, including age, level of knowledge and personal hygiene. Age plays a role in wound recovery, with women aged 20-35 considered to be in the optimal reproductive age range. As individuals grow older, the body's ability to heal tends to decline, making younger women more likely to experience faster recovery. Additionally, knowledge postpartum care greatly affects how quickly perineal wounds heal. A lack understanding regarding hygiene and proper wound management may lead to delayed healing. The Personal hygiene, particularly of the genital area, is essential in preventing infections. Inadequate or improper hygiene can compromise cleanliness, increase the risk of exposure to harmful microorganisms and make individuals more susceptible to infection-related complications. (Santy, E., Trivani, E.P., 2020).

An alternative form of non-pharmacological treatment involves the use of medicinal herbs, such as bangle rhizome (*Zingiber purpureum* Roxb.). This plant, which belongs to the Zingiberaceae family and found throughout Indonesia, the possesses various therapeutic properties. The rhizome is known for its anti-inflammatory, antibacterial and antioxidant effects, which has active compound including are flavonoids, triterpenoids, saponins, tannins, and alkaloids. (Daryanti, E.P., Faizah, B. A., 2023).

Previous studies have explored various formulation types such as ointments, gels and sprays to accelerate wound healing in animal models. Building on this, the present focuses a topical preparation using bangle rhizome extract formulated spray gel for perineal wound healing postpartum mothers, an area where

research remains limited. The spray gel advantages terms of practicality, hygiene, reduced to contamination, and easy application without direct hand contact (Novita, Sri, R., 2024).

Previous research demonstrated that a spray gel containing essential oil extracted from bangle rhizome (*Zingiber purpureum* Roxb.) exhibits optimal healing effects against *Staphylococcus aureus* ATCC 25923 infections in rabbits a concentration of 6.25%. The essential oil was obtained through steam distillation and formulated into spray gels with concentrations of 1.56%, 3.125%, and 6.25%. Antibacterial activity tests showed 6.25% concentration provided the most effective healing outcome, as supported by the Kolmogorov significance ($0.083 > 0.05$), indicating normal the data distribution and no signs of irritation wounds infected with *Staphylococcus aureus* ATCC 25923 (Rochyani, 2017).

This study examines the of a spray gel formulated with bangle rhizome (*Zingiber purpureum* Roxb.) at a 6.25% concentration, applied twice daily over a period of seven days to treat second-degree perineal wounds with sutures. Observations are conducted from day 1 to day 7 to monitor the healing process. Wound recovery is assessed using the REEDA scale evaluates redness, edema, ecchymosis, discharge, and approximation. The REEDA scoring system classifies wound healing as follows: a score of 0 indicates complete healing, 1-5 reflects good healing, 6-10 suggests moderate healing, and 11-15 indicates poor healing. Based on this framework, the study aims to evaluate the effectiveness of the 6.25% bangle rhizome extract spray gel in accelerating perineal wound healing in postpartum mothers. It expected that this treatment as a practical,

safe and natural the therapeutic alternative.

LITERATURE REVIEW

Perineal tears to lacerations in the perineal area that occur during childbirth, commonly affecting women during their first delivery and occasionally in subsequent births. Proper perineal care involves maintaining hygiene and cleanliness in the area between the vulva and anus, starting from the childbirth process until the reproductive organs return to their pre-pregnancy state. Most perineal tears occur during labor and their management to typically the obstetric anesthesia (Ramandey, 2017).

Inadequate perineal care can result in excessive moisture in the perineal area, creating environment conducive bacterial growth, which may lead to infection and delay the wound healing process. Such infections can extend to the urinary tract and birth canal. Although they may not directly obstruct wound closure, these infections can damage surrounding tissues, potentially enlarging the wound in both length and depth (Fauziah, E.N., Retno, w., Shinta, 2022).

Wound healing is influenced by both internal and external factors. External factors that may affect the healing of perineal wounds include the mother's overall condition, environmental influences, cultural practices, personal hygiene, level of knowledge, socioeconomic status and use of antibiotics. On the other hand, internal factors involve aspects such as age, tissue trauma or infection, tissue of the handling techniques, bleeding, hypovolemia, local edema, nutritional, oxygen availability, mode of delivery, hemoglobin levels and the type of sutures used (Novelia, S., Siti, S., Nia, 2023).

The REEDA scale is a clinical tool used to evaluate perineal trauma by assessing five indicators are redness, edema, ecchymosis (bruising), discharge, and wound approximation following childbirth. It serves as a standardized method for healthcare providers to monitor the perineal wound in postpartum individuals. Each component is scored from 0 to 3, reflecting the severity of the condition. The REEDA scale is commonly applied to assess healing progress in first- and second-degree perineal injuries, including both spontaneous lacerations and episiotomies (Nurlina & Runjati, Lanny, 2024).

A study by Dewi et al. (2024) investigated the effects of ointment made from bangle rhizome extract on fibroblast proliferation during incision wound healing in Wistar rats (*Rattus norvegicus*). The findings revealed that concentrations of 80%, 85%, and 90% increased fibroblast cell counts, attributed to bioactive compounds in bangle rhizome such as flavonoids, saponins, terpenoids, tannins, phenols, and alkaloids. Among the tested concentrations, 85% extract ointment demonstrated the most effective wound healing, indicated by the highest average fibroblast count. These results reinforce the potential of bangle rhizome extract in enhancing the wound healing process. (Dewi, P.S., Made, M.S., Pande, G.B.K., 2023).

Study conducted by Suthaningrat (2023) examined the effectiveness of bangle rhizome extract (*Zingiber purpureum* Roxb.) ointment on collagen density during the healing process of tooth extraction wounds in guinea pigs (*Cavia cobaya*). The findings demonstrated ointments with concentrations of 80%, 85%, and 90% significantly enhanced collagen formation. Among these, the 85% concentration was found to be the

most effective in promoting collagen density compared to the 80% and 90% concentrations (Suthaningrat., 2023).

The bangle rhizome (*Zingiber purpureum* Roxb.) is a plant used in traditional medicine in Indonesia. Bangle rhizome extract can inhibit the activity of pancreatic lipase enzymes, thereby inhibiting lipid absorption. Bangle rhizome contains active flavonoids, tannins, steroids, saponins, thirpenoids, and alkaloids (Diastuti, H., Zeni L.M., 2024).

Formulation of Questions

1. Is the administration of spray gel extract of bangle rhizome (*Zingiber purpureum* Roxb) twice a day for 7 days effective in the healing of perineal wounds in postpartum mothers based on the REEDA score (Redness, Oedema, Ecchymosis, Discharge, Approximation)?
2. Is there a difference in the REEDA score for the healing of perineal wounds between the group receiving spray gel extract of bangle rhizome (*Zingiber purpureum* Roxb) twice a day for 7 days and the group with clean dry perineal wound care (personal hygiene)?

RESEARCH METHODOLOGY

This research is True Experiment with a pretest-posttest control group design.

The population in this study consists of all postpartum mothers with second-degree perineal wounds who underwent suturing. The sample consists of 36 postpartum mothers with second-degree perineal wounds using random sampling technique. This study is divided into 2 groups, namely intervention group receiving spray gel extract of bangle rhizome (*Zingiber purpureum* Roxb) twice a day for 7 days with 18 respondents, while the control group with clean

dry care (personal hygiene) consists of 18 respondents.

The inclusion criteria sampling included: postpartum mothers on the first day, normal delivery, second-degree perineal laceration with suturing, days 1 to 7 without complications, still being treated or already discharged, and willing to respondents. The exclusion criteria mothers with labor complications (uterine atony, bleeding, eclampsia, preeclampsia, placental retention), the ostpartum complications, skin allergies and those who were unwilling to be respondents.

Evaluation of healing perineal wounds in postpartum mothers conducted with REEDA instrument (redness, oedema, ecchymosis, discharge, approximation) on day 1 (pretest), posttest on day 3, posttest on day 5, and posttest on day 7. This research is conducted at the Midwife Clinic Neri in Medan City, which has registered with the Health Research Ethics Committee conducted at Poltekkes Kemenkes Semarang and issued an ethical approval with number 636/EA/F.XXIII.38/2025.

Data analysis uses Generalized Linear Model Repeated Measures (GLM-RM) test.

RESEARCH RESULTS

Table 1. Frequency Distribution of Respondent Characteristics in the Control Group and Intervention Group

Respondent Characteristics	Intervention Group		Control Group	
	N	%	N	%
Education				
Elementary School	0	0	2	11,1
Middle School	5	27,8	5	27,8
High School	11	61,1	10	55,6
University	2	11,1	1	5,6
Parity				
Primiparous	10	55,6	12	66,7
Multiparous	8	44,4	6	33,3
Employment				
Working	7	38,9	3	16,7
Not Working	11	61,1	15	83,3
Variable Confounding				
Age				
<20 Years	2	11,1	3	16,7
20-35 Years	11	61,1	6	33,3
>35 Years	5	27,8	9	50,0
Knowledge				
Good	9	50,0	3	16,7
Sufficient	7	38,9	13	72,2
Poor	2	11,1	2	11,1
Personal Hygiene				
Optimal (>4x)	14	77,8	9	50,0
Not Optimal (<4x)	4	22,2	9	50,0

Based on Table 1, the distribution of respondent characteristics indicates that most participants in both groups had a high school level of education, with (61.1%) in the intervention group and (55,6%) in the control group. Regarding parity, the majority were primiparous (55,6%) in the intervention group and 66.7% in the control group. In terms of employment status, a large proportion of participants were unemployed, (61,1%) in the intervention group and (83,3%) in the control group. As for confounding

variables, most participants in the intervention group were aged 20-35 years (61,1%), while in the control group, half (50,0%) were aged over 35 years. In terms of knowledge, half of the intervention group (50,0%) had good knowledge, whereas in the control group, most had moderate knowledge (72,2%). Personal hygiene practices were better in the intervention group, with 14 respondents (77,8%) demonstrating optimal hygiene, compared to 9 respondents (50,0%) in the control group.

Table 2. Homogeneity Test of Confounding Variables

Confounding Variables	Intervention Group		Control Group		Sig
	Mean±SD	Min-max	Mean±SD	Min-max	
Age	2,17±0,618	1-3	2,33±0,767	1-3	0,107
Knowledge	1,61±0,698	1-3	1,94±0,539	1-3	0,023
Personal Hygiene	3,56±0,856	2-4	3,00±1,029	2-4	0,009

* Uji Levene Test

Based on Table 2, the results of the Levene test for the confounding variables, namely age, knowledge, and personal hygiene. In this study, a homogeneity test was conducted on the confounding variable, age, which resulted in a p-value of (0,107>0,05), indicating that both groups are homogeneous/similar, which significantly affects the healing of perineal wounds. For knowledge, the intervention and

control groups showed (p = 0,023), indicating that the two groups are not homogeneous/similar, which affects the healing of perineal wounds. For personal hygiene from the intervention and control groups, it showed (p=0,009), indicating that the two groups are not homogeneous, which affects the healing of perineal wounds in postpartum mothers.

Table 3. Results of Normality Test for Perineal Wound Healing in Postpartum Mothers with REEDA Score

Measurement of REEDA Score	Intervention Group (n=18)		Control Group (n=18)	
	Mean±SD	p-value	Mean±SD	p-value
Pre test	10,33±1,138	0,162	9,89±1,367	0,062
Post test H3	7,06±1,434	0,167	9,61±1,037	0,077
Post test H5	3,89±1,491	0,126	9,00±1,572	0,797
Post test H7	1,72±1,487	0,083	4,94±1,626	0,698

*Shapiro Wilk

Table 3, presents the perineal wound healing scores of postpartum mothers measured at pretest, posttest day 3, posttest day 5, and posttest day 7 in both the

intervention and control groups. The data distribution at each time point was found to be normal, as indicated ($p > 0,05$).

Table 4. Differences in REEDA Score Reduction Before and After on Perineal Wound Healing in Intervention and Control Groups

Measurement of REEDA Score	Mean \pm SD	SE	95%CI	Partial Eta Square	p-value
Intervention Group					
<i>Pretest</i>	10,333 \pm 1,138	0,268	9,768-10,899	0,989	0,000
<i>posttest H-3</i>	7,056 \pm 1,434	0,338	6,343-7,769	0,962	
<i>posttest H-5</i>	3,889 \pm 1,491	0,351	3,148-4,630	0,878	
<i>posttest H-7</i>	1,722 \pm 1,487	0,351	0,983-2,462	0,587	
Control Group					
<i>Pretest</i>	9,889 \pm 1,367	0,322	9,209-10,569	0,982	0,000
<i>posttest H-3</i>	9,611 \pm 1,037	0,244	9,095-10,127	0,989	
<i>posttest H-5</i>	9,000 \pm 1,572	0,370	8,218-9,782	0,972	
<i>posttest H-7</i>	4,944 \pm 1,626	0,383	4,136-5,753	0,907	

*Between Subjects Effects-Repeated Measure

Based on Table 4, the results of the General Linear Model-Repeated Measures (GLM-RM) analysis indicate a statistically significant difference in the reduction of REEDA scores over time between the intervention and control groups ($p = 0,000 < 0,05$). This finding suggests that the intervention group experienced a more substantial and consistent

decrease in REEDA scores, reflecting improved wound healing over time. In contrast, although the control group also showed a significant reduction in REEDA scores ($p = 0,000 < 0,05$), the rate of healing was slower and the overall wound recovery was less optimal compared to the intervention group.

Table 5. Comparison of Perineal Wound Healing in the Intervention Group and Control Group Before and After Based on REEDA Score

Comparison of REEDA Score	Group	Mean Difference	p-value	Interpretation
<i>Pretest >< Posttest Day-3</i>	Intervensi	3,278	0,000	Significant
	Kontrol	0,278	0,813	Not Significant
<i>Pretest >< Posttest Day-5</i>	Intervensi	6,444	0,000	Significant
	Kontrol	0,889	0,067	Not Significant
<i>Pretest >< Posttest Day-7</i>	Intervensi	8,611	0,000	Significant
	Kontrol	4,944	0,000	Significant
<i>Posttest Day-3 >< Posttest Day-5</i>	Intervensi	3,167	0,000	Significant
	Kontrol	0,611	0,267	Not Significant
<i>Posttest Day-5 >< Posttest Day-7</i>	Intervensi	2,167	0,000	Significant
	Kontrol	4,056	0,000	Significant

*Pos hoc Repeated Measure (Pairwise Comparisons)

Based on Table 5, the results of the Pairwise Comparisons analysis in the intervention group revealed statistically significant differences ($p < 0,000$) across all REEDA score measurements (pretest, posttest day 3, posttest day 5, and posttest day 7). This indicates a consistent and meaningful improvement in perineal wound healing over the observation

period, as evidenced by the progressive reduction in REEDA scores. In contrast, the control group showed no statistically significant differences across most time. However, a notable and significant reduction in REEDA scores was observed only on day 7 ($p < 0,000$), suggesting delayed wound healing compared to the intervention group.

Table 6. Eta Square Effect Size

Group	Partial Eta Square Effect Size	Interpretation
Intervensi	0,967	Very Large
Kontrol	0,895	Large

*Partial Eta Square

Based on Table 6, the administration of spray gel containing bangle rhizome extract (*Zingiber purpureum* Roxb.) demonstrated an effect size of 0,967, indicating that 96,7% of the change in REEDA scores reflects a very strong effect on accelerating perineal wound healing in postpartum mothers. In comparison, the control group showed an effect

size of 0,895, meaning that 89,5% of the change in REEDA scores is associated with clean and dry wound care (personal hygiene), though the effect is less substantial than that observed in the intervention group. These findings highlight that the spray gel of bangle rhizome extract is more effective than conventional perineal care in promoting wound healing among postpartum women.

Table 7. The Influence of Confounding Factors on Perineal Wound Healing in the Intervention and Control Groups

Variable		p-value	Partial Eta Square	Conclusion
Age	Pillai's Trace	0,816	0,031	Not Significant
	Wilks Lambda	0,816	0,031	
	Hotelling's Trace	0,816	0,031	
	Roy's Largest Root	0,816	0,031	
Knowledge	Pillai's Trace	0,372	0,101	Not Significant
	Wilks Lambda	0,372	0,101	
	Hotelling's Trace	0,372	0,101	
	Roy's Largest Root	0,372	0,101	
Personal Hygiene	Pillai's Trace	0,958	0,010	Not Significant
	Wilks Lambda	0,958	0,010	
	Hotelling's Trace	0,958	0,010	
	Roy's Largest Root	0,958	0,010	

*Uji Multivariat Repeated Measure

Based on Table 7, the multivariate test results indicate that the variables of age, knowledge, and personal hygiene do not significantly influence changes in REEDA scores throughout the

observation period ($p > 0,05$). This suggests that these variables are not interactive or contributing factors in the process of perineal wound healing among postpartum mothers.

DISCUSSION

The findings of this study demonstrate that the application of bangle rhizome extract (*Zingiber purpureum* Roxb.) spray gel twice daily for seven consecutive days effectively accelerates perineal wound healing in postpartum mothers. This is evidenced by a significant reduction in REEDA scores in the intervention group compared to the control group. As the REEDA scores in both the intervention and control groups were normally distributed at each assessment point (pretest, posttest day 3, day 5, and day 7), a Generalized Linear Model Repeated Measures (GLM-RM) analysis appropriately conducted.

The reduction in REEDA scores observed in both the intervention and control groups indicates a significant interaction effect over time during the observation period. In this study, the intervention group demonstrated more favorable wound healing outcomes, whereas the control group showed slower and less optimal healing. These findings suggest a statistically significant difference between the two groups, highlighting the effectiveness of the intervention in promoting perineal wound healing among postpartum mothers.

The physiological process of wound healing progresses through several phases: inflammation, proliferation, and remodeling. By the third day, the inflammatory phase predominates, although signs of inflammation begin to subside. By the fifth day, the proliferative phase becomes evident, characterized by fibroblast activity and the formation

of new tissue, leading to a reduction in REEDA scores. On the seventh day, the wound enters the early remodeling phase, marked by collagen fiber reorganization and tissue strengthening, which contributes to a more substantial improvement in the REEDA score. These findings are consistent with prior studies outlining the stages of wound healing, including the inflammatory, proliferative (or fibroblastic), and maturation phases. (Naziyah, Rizki, H., 2022).

The results of the Repeated Measures Generalized Linear Model (GLM-RM) analysis in the intervention group demonstrated that all pairwise comparisons across the REEDA score measurement (pretest, posttest day 3, posttest day 5, and posttest day 7) showed statistically significant differences ($p < 0.000$). The findings indicate that the intervention effectively accelerated perineal wound healing, with progressive improvement observed throughout the observation period. In contrast, the control group did not exhibit statistically significant changes each individual, however, a notable reduction in REEDA scores was observed on day 7 ($p < 0.000$), suggesting delayed but eventual progress in wound healing.

Based on the results of the statistical test, the alternative hypothesis is accepted, indicating a highly significant reduction in REEDA scores within the intervention group that received the bangle rhizome extract spray gel at each time interval. This suggests that perineal wound healing occurs more rapidly

and effectively in postpartum mothers treated with the spray gel. Moreover, intervention demonstrates a substantial effect in accelerating wound healing when compared to the control group, which received standard clean and dry care (personal hygiene).

In the distribution of respondent characteristics, age was found to be homogeneous between intervention and control groups, whereas the knowledge and personal hygiene were heterogeneous and initially suspected influence perineal wound healing. Therefore, a multivariate test was conducted to evaluate the effect of REEDA score measurement times (pretest, posttest on day 3, day 5, and day 7) in relation to potential confounding variables are age, knowledge and personal hygiene. The results showed that these variables did not significantly influence perineal wound healing process throughout the observation period.

Age is a physiological factor that influences the body's ability to regenerate tissue and heal wounds. In the context of perineal wound healing, individuals within the productive age range (20-35 years) typically experience a more optimal healing process due to better immune function and circulatory health. In contrast, younger or older individuals may have reduced tissue repair capabilities. Since age is closely associated with physiological condition of the mother's body, it plays a critical role in determining the speed and effectiveness of wound healing (Triyani, Y., Ivon, D.W., dan Gatut, 2021).

Regarding maternal knowledge, differences in knowledge levels between the intervention and control groups may influence perineal wound healing. Knowledge plays a crucial role in shaping mothers' behaviors toward proper wound care. Mothers

with good knowledge are more likely to maintain wound hygiene by keeping the area clean, dry, and protected from infection. They are also more inclined to practice appropriate care, such as regularly changing sanitary pads, washing hands before and after wound care, and observing for signs of infection. A mother's understanding of perineal wound care directly affects her attitudes and practices, which in turn impact the effectiveness of the healing process. (Supiani, Yanti, 2024). The results of this study are consistent with the findings of Eti Herlina (2023), which revealed a significant relationship ($p = 0.001 < 0.05$) between maternal knowledge and perineal wound care at the Citra Adinda Primary Clinic in Musi Rawas Regency. Maternal knowledge serves as a fundamental basis for behavior in conducting proper perineal wound care. This knowledge may be acquired through education, personal observation, or information obtained from healthcare providers or other reliable sources. (Herlina, E., Tita, S.H., Ronalen, 2023). Postpartum mothers who possess a strong understanding of perineal wound care are generally more proficient in maintaining hygiene and supporting faster wound healing. In contrast, limited knowledge may lead to suboptimal practices, increasing the risk of delayed healing, infection, and other complications during the postpartum period (Ratna, M., I., Novalia, W.N., Fadhiyah, N.A, Frani, 2024).

Differences in personal hygiene influence the healing of perineal wounds in postpartum mothers. Personal hygiene plays a crucial role in preventing infections in perineal wounds. Poor hygiene of the genital area can lead to the growth of pathogenic bacteria, which hinders the wound healing process and may cause the complications

such as infection, pain and edema. The results of this study are consistent with previous research, which found a significant relationship between personal hygiene and perineal wound healing. Using the chi-square and Fisher's exact tests, a significance level of $p=0.001$ was obtained ($p<0.05$), indicating that personal hygiene significantly affects the healing process of perineal wounds in postpartum at Lamadukelleng Sengkang Hospital (Rosmiati, 2022).

Previous studies have explored various formulation types—such as ointments, gels, and sprays—to support wound healing in animal models. These findings suggest that developing topical preparations using bangle rhizome (*Zingiber purpureum* Roxb.) holds potential for application in perineal wound treatment. In this study, the bangle rhizome spray gel underwent several quality control tests, including organoleptic evaluation, viscosity measurement, pH assessment, and homogeneity testing. The organoleptic test assessed physical characteristics such as color, odor, and texture, and the resulting preparation was yellowish-brown in color, emitted a distinctive bangle aroma, and exhibited a slightly viscous liquid consistency. The viscosity of the gel was measured at 19 dPas, and the pH was found to be 6.71, which remains within the optimal physiological pH range for skin application.

In this study, a phytochemical analysis of bangle rhizome extract (*Zingiber purpureum* Roxb.) was conducted, revealing the presence of several bioactive compounds, including flavonoids, saponins, tannins, alkaloids and terpenoids. These constituents contribute significantly to the reduction of REEDA scores and the acceleration of wound healing. Flavonoids act as potent antioxidants and anti-

inflammatory agents, protecting cellular structures and supporting tissue repair. Saponins possess antiseptic properties and stimulate epidermal cell proliferation, facilitating keratinocyte migration and promoting epithelialization of the wound. Tannins serve as natural astringents, aiding in the cessation of exudates and minor bleeding, promotes faster wound closure. Alkaloids exhibit antimicrobial and antibacterial properties and serve as immunostimulants that enhance the body's defense against pathogens. Terpenoids also act as astringents and antimicrobials; they support wound contraction, the promote epithelialization, inhibit lipid peroxidation, prevent necrosis, and enhance vascularization there by accelerating overall wound healing process (Khairunnisa, Yessi, R., 2025).

The effectiveness of intervention group is evident in the consistent and more rapid reduction in REEDA scores compared to the control group across all measurement points (pretest, and posttests on days 3, 5, and 7). This outcome supports the hypothesis that bioactive compounds found in bangle rhizome such as flavonoids, saponins, alkaloids, tannins and terpenoids contribute significantly to wound healing through their anti-inflammatory, antiseptic and antioxidant. These compounds reduce inflammation, inhibit the growth of infection-causing the microorganisms and accelerate tissue regeneration in the wound area. The use in the form of a spray gel makes active substance easily absorbed and distributed in the perineal wound area, providing a more effective and efficient effect. Therefore, researchers assume that study can be applied complementary treatment in midwifery that can accelerate the

healing process of perineal wounds in postpartum.

CONCLUSION

Based on the results of the study, the intervention group given the spray gel of bangle rhizome extract (*Zingiber purpureum* Roxb.) had a greater effect compared to the control group. This indicates that the administration of the spray gel of bangle rhizome extract (*Zingiber purpureum* Roxb.) for 7 days, twice a day at a concentration of 6,25%, is more effective for the healing of perineal wounds in postpartum mothers. In the study, a GLM-RM test was conducted on the intervention group, which the experienced a significant decrease in REEDA scores with a p-value of (0,000<0,05) at each measurement time, while the control group showed a significant decrease in REEDA scores (p<0,000) on day 7 regarding perineal wound healing. The multivariate results showed that confounding variables such as age, knowledge, and personal hygiene had no effect on the confounding factors in the changes in REEDA scores regarding perineal wound healing.

REFERENCES

- Daryanti, E.P., Faizah, B. A., dan D. A. M. (2023). Perbandingan Skrining Fitokimia Ekstrak Etanol Rimpang Bangle (*Zingiber purpureum*) Metode Maserasi Refluks. *Borneo Journal of Pharmascientech*, 07(02), 52-53. DOI: <https://doi.org/https://doi.org/10.51817/bjp.v7i2.479>
- Dewi, P.S., Made, M.S., Pande, G.B.K., dan S. (2023). Efektivitas Salep Ekstrak Rimpang Bangle (*Zingiber Purpureum* Roxb) Terhadap Kepadatan Kolagen Pada Proses Penyembuhan Luka Pencabutan Gigi Marmut (*Cavia Cobaya*). 776-788. <http://eprints.unmas.ac.id/id/eprint/5432/>
- Diastuti, H., Zeni L.M., dan P. (2024). Isolasi Senyawa Metabolit Sekunder dari Fraksi Etil Asetat Rimpang Bangle (*Zingiber cassumunar* Roxb.) serta Uji Aktivitas terhadap *Candida albicans*. *Jurnal Sains Dan Edukasi Sains*, 7(1), 29-36. <https://doi.org/10.24246/juses.v7i1p29-36>
- Dinas Kesehatan Provinsi Sumatera Utara. (2023).
- Fauziah, E.N., Retno, w., Shinta, W. (2022). Factors Related to Perineal Wound Healing in Postpartum Mothers at Jawilan Public Health Center. *Nursing and Health Sciences Journal (NHSJ)*, 2(2), 41-46. DOI: <https://doi.org/10.53713/nhs.v2i2.72>
- Herlina, E., Tita, S.H., Ronalen, S. (2023). Hubungan Karakteristik Dan Pengetahuan Ibu Dengan Perawatan Luka Perineum Di Klinik Pratama Citra Adinda Kabupaten Musi Rawas Tahun 2023. *Journal Of Midwifery*, 11(2), 227-235. DOI: 10.37676/jm.v11i2.5106
- Isfaroh, M., & Cobalt Angio, M. (2023). The Effect of Perineal Massage Using VCO (Virgin Coconut Oil) Oil on Lacerations of the Birth Canal in Normal Childbirth. *Indonesian Journal of Midwifery*, 6(1), 9-17. DOI: 10.35473/ijm.v6i1.1948
- Khairunnisa, Yessi, R., dan I. E. S. (2025). Studi Efektivitas Antibakteri Ekstrak Etanol Rimpang Bangle (*Zingiber Purpureum* Roxb) Terhadap Patogen *Shigella Dysenteriae*. *Journal of Research in Pharmacy*. 74-85. DOI:10.14710/genres.v5i1.25307

- Lestari, A., dan Nur, A. (2024). Efektifitas Senam Kegel Terhadap Penyembuhan Luka Perineum Pada Ibu Postpartum. *Jurnal Penelitian Perawat Profesional*, 6(1), 79-80. DOI: 10.37287/jppp.v6i1.2069
- Naziyah, Rizki, H., dan M. (2022). Penyuluhan Manajemen Luka Terkini dalam Situasi Pandemic Covid -19 Melalui Kegiatan Pesantren Luka dengan Menggunakan Media Zoom Meeting Bagi Mahasiswa Prodi Keperawatan & Profesi Ners Fakultas Ilmu Kesehatan Universitas Nasional Jakarta. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM)*, 5(7), 2062-2063. DOI: <https://doi.org/10.33024/jkpm.v5i7.6223>
- Novelia, S., Siti, S., Nia, K. (2023). The Effect of Pineapple Juice on Perineal Wound Healing Among Post Partum Women. *Nursing and Health Sciences Journal (NHSJ)*, 3(1), 32-36. DOI:<https://doi.org/10.53713/nhs.v3i1.146>
- Novita, Sri, R., Supriyadi. (2024). Efektivitas Spray Gel Ekstrak Calendula Officinalis (Tagetas Erecta L) Terhadap Penyembuhan Luka Perinium Pada Ibu Nifas. *Media Penelitian Dan Pengembangan Kesehatan*, 34(4), 824-832. DOI: <https://doi.org/10.34011/jmp2k.v34i4.2277>
- Nurlina, & Runjati, Lanny, S. (2024). Efektivitas Patch Transdermal Ekstrak Sarang Burung Walet (Aerodramus Fuciphagus) Terhadap Penyembuhan Luka Perineum Pada Ibu Postpartum. *Jurnal Riset Kesehatan Poltekkes Depkes Bandung*, 17(1), 45-57. DOI: 10.34011/juriskesbdg.v17i1.2700
- Profil Kesehatan Kota Medan Tahun 2023. (2023). *Dinas Kesehatan Kota Medan*.
- Ramandey, S. (2017). *Kebidanan Teori dan Asuhan*. Buku Kedokteran Erlangga Gramedia Ciptakarya (EGC).
- Ratna, M., I., Novalia, W.N., Fadhiyah, N.A, Frani, M. (2024). The Relationship Of Knowledge Oo Post Hecting Perineum Wound Care To Post Partum Wound Healin In The Working Arera Of The Gadang Hanyar Health Center. *Jurnal Delima Harapan*, 000(2), 19-25. DOI: 10.31935/delima.v11i2.253
- Rochyani, F. (2017). *Uji Aktivitas Antibakteri Spray Gel Minyak Atsiri Rimpang Bangle (Zingiber cassumunar Roxb.) Terhadap Staphylococcus aureus ATCC 25923 Secara In Vivo* [Universitas Setia Budi Surakarta]. <http://repo.setiabudi.ac.id/id/eprint/1045/>
- Rosmiati. (2022). Pengaruh Personal Hygiene Terhadap Proses Penyembuhan Luka Perineum Pada Ibu Post Partum di RSUD Lamaddukelleng Sengkang. *Initium Medica Journal*, 2(1)
- Rusana, E., Lasria, S., Henny, R., dan Lidia, S. (2024). Efektifitas Rebusan Daun Sirih Terhadap Penyembuhan Luka Perineum di Klinik PPK 1 Yonkes 1 Kostrad Bogor Jawa Barat Tahun 2023. *Jurnal Ilmiah Ilmu Kesehatan Dan Kedokteran*, 2(2), 158-166. DOI:10.55606/termometer.v2i2.3668
- Santy, E., Trivani, E.P., dan L. (2020). Hubungan Pemberian Tambahan Putih Telur Terhadap Percepatan Penyembuhan Luka Perineum Derajat Ii Pada Ibu Nifas Di Bpm Utin Mulia Tahun 2019. *Jurnal Kebidanan Khatulistiwa*, 6(1), 22. DOI: 10.30602/jkk.v6i1.506

- Silaban, T. D. S. (2024). Faktor Resiko Yang Berhubungan Dengan Terjadinya Rupture Perineum Pada Ibu Bersalin. *Jurnal Kesmas Peima Indonesia*, 8(1), 3-5. DOI: <https://doi.org/10.34012/jkpi.v8i1.4753>
- Simarmata, M. (2022). Differences in the Healing of Perineal Wounds in Postpartum Mothers and Hecting Using the Dotted Technique and the Basting Technique. *Science Midwifery*, 10(5), 4219-4224. DOI: <https://doi.org/10.35335/midwifery.v10i5.953>
- Suthaningrat. (2023). *Efektivitas Salep Ekstrak Rimpang Bangle (Zingiber Purpureum Roxb) Terhadap Kepadatan Kolagen Pada Proses Penyembuhan Luka Pencabutan Gigi Marmut (Cavia Cobaya)*. [Universitas Mahasaraswati Denpasar]. <http://eprints.unmas.ac.id/id/eprint/5448>
- Triyani, Y., Ivon, D.W., dan Gatut, H. (2021). Factors Influencing the Process of Perineal Wound Healing in Postpartum Women in Serui Hospital, Papua. *Indonesian Midwifery and Health Sciences Journal*, 5(4), 398-405. DOI: 10.20473/imhsj.v5i4.2021.398-405