



Relationship of lemongrass decoction administration on perineal wound healing

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ARTICLE INFO	ABSTRACT
Article history: Received 10 February 2026 Revised 04 August 2026 Accepted 08 August 2026 Published 23 August 2026 Keywords: Lemongrass decoction Perineal wound Wound healing Postpartum mother Plantation clinic	Background: Perineal wounds are a common childbirth complication that significantly impacts maternal quality of life. In resource-limited settings such as plantation clinics, effective, safe, and affordable solutions are needed. Lemongrass decoction as a traditional application holds potential as complementary therapy, but empirical evidence for postpartum perineal wounds remains limited. Objective: To determine the relationship between the administration of lemongrass decoction and the healing of perineal wounds in postpartum mothers at the PT. GSPP Polyclinic. Methods: A quasi-experimental study with a non-equivalent control group design was conducted on 20 postpartum mothers divided into intervention and control groups. The intervention group received standard care plus topical application of lemongrass decoction twice daily, while the control group received standard care only. Wound healing was assessed based on clinical time (≤ 6 days for the 'Good' category) up to day 7. Data analysis used Fisher's Exact test and Odds Ratio (OR) calculation. Results: Most mothers who received lemongrass decoction (9 out of 10) experienced good healing (< 6 days), while the majority who did not receive the intervention (7 out of 10) experienced poor healing (≥ 6 days). The relationship was statistically significant ($p=0.020$). Mothers who did not receive lemongrass decoction therapy had 21 times higher odds of experiencing poor healing (OR = 21.000; 95% CI: 1.777-248.103). Conclusion: The administration of lemongrass decoction has a significant and protective relationship with the acceleration of perineal wound healing in postpartum mothers.

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1. Introduction

Perineal wounds, particularly perineal tears during childbirth, represent an exceptionally common postpartum complication with a significant impact on women's quality of life. Globally, an estimated 80-90% of women who undergo vaginal delivery experience some form of perineal trauma (Man et al., 2024; Schmidt & Fenner, 2024). These injuries



precipitate serious short-term morbidities, including severe pain, discomfort during sitting, walking, and urination, as well as an elevated risk of infection (Głoćko et al., 2025; Okeahialam et al., 2024). Furthermore, in the long term, suboptimally managed perineal wounds can lead to pelvic floor dysfunction, dyspareunia (pain during sexual intercourse), and urinary or anal incontinence. These sequelae exert a profound psychosocial influence, adversely affecting maternal well-being, infant bonding, and potentially contributing to postpartum depression (Efua, 2024; Espitia-De La Hoz, 2021; Leyland, 2024; Silva et al., 2024; VanWiel et al., 2025). The management of perineal wounds, especially those resulting from surgery or severe trauma, poses a significant clinical challenge. Preventive intrapartum measures, such as controlled delivery techniques and perineal support, can reduce the incidence and severity of perineal injury. Complications including wound sepsis, fistula formation, and persistent sinus tracts can substantially increase morbidity and healthcare costs (Mori & Tiernan, 2022; Petrenko & Bulba, 2024).

The management of perineal wounds becomes more complex when access to optimal healthcare facilities and follow-up care is limited, a situation faced by many female plantation workers. The PT. GSPP plantation polyclinic in Kotawaringin Barat Regency, Central Kalimantan, serves as a primary healthcare facility for the worker population and their families. Registry data from the clinic's maternity unit over the past six months indicates that out of 120 normal deliveries, 78 mothers (65%) experienced first or second-degree perineal tears requiring suturing. A preliminary survey of 30 postpartum mothers at the location revealed that 70% complained of suture site pain persisting beyond 7 days, 40% exhibited mild inflammatory signs such as redness, and the average clinical healing time (suture removal without complication) was 12-14 days, exceeding the ideal timeframe of 7-10 days. The primary constraints are the limited availability of healthcare personnel for intensive monitoring and economic factors hindering access to modern wound care medications. Consequently, there is a pressing need for a treatment solution that is effective, safe, affordable, and readily accessible from the local environment. It is within this context that the potential of traditional plant-based medicine emerges as a promising complementary alternative. The culture of Kalimantan communities, including in Kotawaringin Barat, has a long history of utilizing various spices and herbal plants for treatment, establishing a strong socio-cultural foundation for implementing therapies based on local wisdom (Mukti, 2024).



One potential botanical candidate is lemongrass (*Cymbopogon citratus* Linn.), traditionally employed for its antiseptic and anti-inflammatory properties (Ahire et al., 2022; Thasrin & Anitha, 2023; Upadhyay et al., 2021). Modern pharmacological research confirms that lemongrass is rich in bioactive compounds such as citral, geraniol, citronellal, flavonoids, and tannins. Its essential oil, particularly with citral as a primary component, has demonstrated potent in vitro and in vivo antibacterial activity against common wound-infecting pathogens, including *Staphylococcus aureus* and *Escherichia coli* (Dwivedi, 2024; Mishra, 2024; Mukarram et al., 2021; Naz et al., 2024; Tazi et al., 2024; Wadhwa et al., 2023). An additional mechanism is its anti-inflammatory activity, whereby compounds in lemongrass inhibit the cyclooxygenase (COX) enzyme and the production of pro-inflammatory mediators like prostaglandin E2 and TNF- α , thereby reducing edema and pain (Boukhatem et al., 2014). Furthermore, its antioxidant constituents, such as flavonoids, help counteract oxidative stress at the wound site, fostering an environment conducive to fibroblast proliferation and collagen synthesis (Esfandiar & Esmaeili, 2025; Juszczak et al., 2022).

Preliminary animal studies indicate the potential of lemongrass for wound care. Research on rats demonstrates that a lemongrass ethanol extract gel significantly accelerates the closure of excision wounds, while the topical application of lemongrass oil enhances re-epithelialization in burn wounds in rabbits (Wisdawati et al., 2025; Wisdawati & Razak, 2024). However, critical research gaps remain. Direct evidence of its efficacy on postpartum perineal wounds in humans is still very limited. Furthermore, existing studies predominantly utilize extracts or oils, whereas the potential of a lemongrass decoction (infusion), which is simpler to prepare and more congruent with traditional application methods, has not been extensively evaluated clinically. Finally, no study has tested this intervention within a specific setting such as a plantation, with its unique patient characteristics and facility limitations, for instance, at a corporate plantation clinic like PT. GSPP. Therefore, this study is designed to address these gaps by investigating the relationship between the administration of lemongrass decoction as a complementary therapy and the healing of perineal wounds in postpartum mothers at the PT. GSPP plantation polyclinic, Kotawaringin Barat Regency. This research is expected to provide locally-based empirical evidence for the effectiveness of an accessible, low-cost, and sustainable herbal intervention to improve maternal health in resource-constrained areas.



2. Methods

Research design

This study employed a quasi-experimental design, comparing perineal wound healing outcomes between two groups. The intervention group received standard care supplemented with topical application of lemongrass decoction, while the control group received standard care only without the lemongrass intervention. This design was selected for its utility in pilot studies and for testing complex interventions, providing preliminary evidence to guide further research (Reichardt et al., 2023).

Participants

The study population consisted of all postpartum mothers who delivered vaginally and experienced a perineal wound (tear or episiotomy) at the PT. GSPP Polyclinic in Kotawaringin Barat Regency during the period March-April 2024, totaling 28 individuals. A non-probability sampling technique, specifically purposive sampling, was used to recruit participants. All eligible postpartum mothers meeting the inclusion criteria were consecutively enrolled until the target sample size was reached (Mukti, 2025). The final sample comprised 20 participants, divided into two groups: 10 in the intervention group and 10 in the control group. Inclusion criteria included: 1) First-day postpartum mothers with first- or second-degree perineal wounds, 2) Willingness to participate by providing informed consent, and 3) No history of allergy to lemongrass. Exclusion criteria included mothers with third- or fourth-degree perineal tears, systemic infection, or severe comorbidities such as diabetes mellitus.

Data collection

Primary data were collected through direct observation and clinical examination. The primary instrument was a perineal wound healing observation sheet. Wound healing parameters were assessed using the REEDA scale (redness, edema, ecchymosis, discharge, and approximation) (UYSAL & SÖNMEZ DÜZKAYA, 2022). Healing was categorized as "Good" if these signs were absent and the wound closed within ≤ 6 days, and as "Poor" if one or more signs were present and/or healing required ≥ 6 days. Observations were conducted daily from the first to the seventh day postpartum.

The intervention administered to the treatment group involved compressing or rinsing the perineal area using sterile gauze soaked in lemongrass decoction. The decoction was prepared by boiling 50 grams of fresh lemongrass in 500 ml of water until reduced to 200 ml,



then cooled to a safe, warm temperature (Sari, 2017). This procedure was performed twice daily after cleansing the perineal area with clean water. To ensure intervention consistency, the procedure was carried out by the researcher or a trained clinic midwife.

Data analysis

Data were analyzed statistically using SPSS version 26. Categorical data for the variables of lemongrass decoction administration and wound healing outcome are presented in frequency distribution tables and percentages. Bivariate analysis was performed using Fisher's Exact Test, as 50% of the cells had an expected count of less than 5, to examine the relationship between lemongrass decoction administration and perineal wound healing at a significance level of $\alpha=0.05$. To quantify the strength of the association, the Odds Ratio (OR) was calculated with a 95% confidence interval (Sánchez Vanegas et al., 2024; Wirtz, 2017). Results were considered statistically significant if the p-value was less than 0.05.

Ethical consideration

This study received ethical approval from the Research Ethics Committee of Sari Mulia University, Banjarmasin, Indonesia (Approval Number: 277/KEP-UNISM/VI/2024). All procedures adhered strictly to the principles outlined in the Declaration of Helsinki. Prior to participation, all subjects were fully informed about the study's aims, procedures, potential risks, and benefits, and provided written informed consent. Confidentiality of all participant data was maintained throughout the research process.

3. Results

Table 1 presents a quantitative overview of the primary outcome variable—the wound healing status across the entire study sample. Of the 20 postpartum mothers who participated, more than half exhibited favorable healing progress. Specifically, 12 mothers (60%) experienced perineal wound healing categorized as "Good," characterized by positive clinical signs and wound closure achieved in less than 6 days. Conversely, the remaining 8 mothers (40%) experienced healing categorized as "Poor," where the healing process required 6 days or more.

Table 1. Frequency distribution of perineal wound healing in postpartum mothers (N=20)

No	Wound healing	Frequency	Percentage (%)
1	Good (< 6 days)	12	60
2	Poor ($\geq$ 6 days)	8	40
Total		20	100



Table 2 presents the cross-tabulation of lemongrass decoction administration with perineal wound healing outcomes. The majority of mothers who did not receive the decoction (7 out of 10, or 87.5%) experienced poor wound healing (≥ 6 days). In contrast, most mothers who received the intervention (9 out of 10, or 75.0%) achieved good wound healing (< 6 days). This difference was subsequently tested for statistical significance. The control group (no decoction) was predominantly characterized by poor healing outcomes (87.5%), whereas the intervention group was dominated by good healing outcomes (75.0%). A Fisher's Exact Test was performed to determine the significance of this association, yielding a p-value of 0.020. This result indicates that the relationship between lemongrass decoction administration and perineal wound healing is statistically significant at the 95% confidence level ($\alpha < 0.05$), meaning the observed difference is highly unlikely to be due to chance alone.

The calculated odds ratio (OR) was 21.000 with a 95% confidence interval (CI) of 1.777 to 248.103. This indicates that mothers who did not receive lemongrass therapy had 21 times greater odds of experiencing poor perineal wound healing compared to those who did receive it. The fact that the confidence interval does not include the value of 1 further strengthens the evidence that this association is significant. In other words, the administration of lemongrass decoction is statistically proven to be a strong protective factor that significantly reduces the risk of poor perineal wound healing.

Table 2. Relationship between lemongrass decoction administration and perineal wound healing (N=20)

Lemongrass decoction	Perineal wound healing		OR (95% CI)	P-value
	Poor (≥ 6 days)	Good (< 6 days)		
Not given	7 (87.5)	3 (25)	21.000 (1.777-248.103)	0.02
Given	1 (12.5)	9 (75)		
Total	8(100)	12 (100)		

4. Discussions

The findings of this study demonstrate that the topical administration of lemongrass decoction has a statistically significant association with accelerated perineal wound healing in postpartum mothers. An odds ratio (OR) of 21.000 (95% CI: 1.777-248.103) and a p-value of 0.020 confirm the statistical effectiveness of this intervention. This outcome aligns with the documented pharmacological mechanisms of lemongrass. The antibacterial activity of its key constituents, such as citral and geraniol, effectively inhibits the growth of common perineal



pathogens like *Staphylococcus aureus* and *Escherichia coli*, thereby preventing secondary infections that can impede healing (Bhattamisra et al., 2018; Lopez-Romero et al., 2015). Furthermore, lemongrass's anti-inflammatory properties, mediated through the inhibition of the cyclooxygenase (COX) enzyme and the production of prostaglandin E2, contribute to reducing edema and erythema—two primary parameters in the REEDA (Redness, Edema, Ecchymosis, Discharge, Approximation) scale, which was indirectly utilized in this study (Kim et al., 2022; Sari et al., 2025). By mitigating an excessive inflammatory response, the proliferative phase of wound healing, encompassing angiogenesis and collagen synthesis, can commence more rapidly.

These findings are consistent with results from animal models, despite differences in clinical context. Wisdawati (2025) reported that a lemongrass ethanol extract gel accelerated the closure of excision wounds in mice, while Yoyada (2011) observed faster re-epithelialization in incision wounds treated with lemongrass oil. The strength of the current study lies in its direct application to a human population, specifically postpartum mothers, utilizing a decoction formulation that is more accessible and aligned with traditional practices. This addresses a significant research gap, as previous studies have predominantly focused on standardized extracts or essential oils, which involve complex preparation processes and are less practical for community-based settings with limited resources. The efficacy of the decoction indicates that water-soluble bioactive compounds such as flavonoids and tannins retain sufficient therapeutic activity to modulate the wound healing process, notably through antioxidant action that counteracts oxidative stress at the wound site and supports fibroblast proliferation (Kamble et al., 2025; Tiara Fortuna A.R et al., 2025).

Although statistically significant, the notably wide confidence interval (CI) (1.777 to 248.103) reflects substantial estimation uncertainty due to the small sample size (N=20). Consequently, while the direction of the association is strongly favorable, the true effect magnitude may be more moderate. These findings should therefore be considered as promising preliminary evidence, requiring replication with a larger sample to obtain a more precise effect estimate. Furthermore, while the quasi-experimental design facilitated field-testing of the intervention, the absence of randomization increases the risk of selection bias. Despite the use of purposive sampling, unmeasured characteristics between the two groups—such as nutritional status, personal hygiene practices, or variations in suturing



techniques—could have influenced the outcomes. Future research employing a randomized controlled design with blinding, along with objective serial measurements such as the REEDA scale, is strongly recommended to strengthen causal inference.

From a nursing and midwifery perspective, the lemongrass decoction intervention offers a solution congruent with the principles of evidence-based practice and patient-centered care. This intervention is not only effective but also fulfills the critical criteria of affordability, ease of application, and sustainability—essential factors within a primary healthcare setting such as a plantation clinic. Utilizing local botanicals also empowers traditional knowledge and may enhance maternal compliance, as patients often feel more familiar and comfortable with culturally based treatments (Bambague et al., 2024; MULYANTO et al., 2024). Traditional medicine provides an accessible alternative to modern healthcare, particularly in regions with limited access to medical facilities (Angela et al., 2014).

Despite the promising results, several limitations in this study warrant consideration. The relatively small sample size (N=20) may affect the generalizability of the findings. Furthermore, the observation period was limited to the first 7 days postpartum, which does not capture long-term outcomes such as scar tissue strength or the incidence of dyspareunia. Other confounding factors that could influence wound healing—including maternal nutritional status, suturing techniques, and compliance with basic hygiene care—were also not fully controlled for within this quasi-experimental design. Consequently, the results must be interpreted with caution and require replication using a more robust methodological framework.

Overall, this study provides valuable empirical evidence for efforts to reduce postpartum maternal morbidity, particularly in resource-limited settings. The finding that a simple and low-cost intervention can drastically reduce the odds of poor wound healing carries broad practical implications for maternal health policy at the community level. Future research should be developed to explore the optimal dosage and application frequency, as well as to compare the efficacy of lemongrass decoction with conventional antiseptics such as povidone-iodine. Further pharmacological studies are also required to identify the specific water-soluble active compounds in the decoction responsible for the wound healing effects, paving the way toward evidence-based standardization of this herbal intervention.

5. Conclusion



Based on the research findings, it can be concluded that the administration of lemongrass decoction has a significant and protective relationship with perineal wound healing in postpartum mothers, with its efficacy demonstrated through the acceleration of clinical healing time.

6. Conflict of interest

All authors declare no conflict of interest.

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