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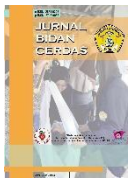

Effects of Reflexology Therapy Implementation for Postpartum Mothers' Well-being at a Health Care Facility

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ABSTRACT

Background: The well-being of postpartum mothers is a crucial aspect of maternal health services. However, many women encounter challenges during childbirth, including severe pain, stress, and a lack of information on pain management. Data from the Association of Indonesian Hospitals show that 15% of postpartum mothers experience complications, 21% suffer from severe pain, and 64% do not receive information on how to reduce labor pain. Reflexology therapy serves as a non-pharmacological method to relieve pain and enhance relaxation. This study analyzed the effectiveness of reflexology therapy in reducing pain and stress while improving the satisfaction of postpartum mothers with maternal health services.

Methods: The study used a quasi-experimental design with a pretest–posttest control group, conducted from June to October 2025 at Gondo Suwarno Hospital, Ungaran. Researchers purposively selected 60 postpartum mothers and divided them into two groups: an intervention group and a control group. Data were analyzed using paired t-tests and independent t-tests with a significance level of 0.05.

Results: Reflexology therapy significantly reduced pain and stress scores and increased maternal satisfaction in the intervention group, while no significant changes were observed in the control group. Between-group comparisons confirmed that the magnitude and direction of outcome changes favored the intervention group ($p < 0.05$). Reflexology therapy significantly reduced pain and stress levels in the intervention group compared to the control group ($p < 0.05$) and increased satisfaction with health services.

Conclusion: Reflexology therapy contributes to postpartum maternal well-being through physiological pain modulation, psychological relaxation, and improved perceptions of care quality. Healthcare providers are encouraged to integrate reflexology as a complementary intervention in maternal health services.

INTRODUCTION

Researchers have developed various methods to enhance maternal comfort during the postpartum period, including reflexology. Reflexology involves stimulating specific reflex points on the body to promote relaxation and reduce pain. Previous studies have shown that this therapy can improve maternal well-being. However, few studies have evaluated its effectiveness within Indonesian healthcare facilities. Maternal well-being during the postpartum period plays a key role in achieving high-quality maternal healthcare globally because childbirth is one of the most critical moments in a woman's life, carrying high risks of complications and maternal or neonatal death (Putri, Hanifah, & Irawan, 2023;Fransisca & Yusuf, 2019). Although pharmacological interventions have advanced considerably, non-pharmacological approaches such as reflexology

or massage therapy have gained attention for their ability to enhance relaxation and comfort among postpartum mothers (Nasution, Harahap, & Lubis, 2025).

Nationally, pain management after childbirth remains suboptimal. Many mothers still experience severe pain, which can delay recovery and affect both physical and psychological well-being (Pasiriani & Juniawati, 2023). Locally, Indonesian healthcare facilities have implemented reflexology interventions in combination with other techniques, such as postpartum massage and finger reflexology, with promising outcomes in reducing pain (Leki & Ti'ani, 2024). Nevertheless, comprehensive research assessing the effects of reflexology on maternal well-being—including pain, stress, and satisfaction with care—remains limited in Indonesia(Suryani, E. & Pramudito, 2024). Therefore, this study aims to analyze the impact of reflexology on maternal well-being among postpartum mothers in healthcare facilities (Indonesia, 2023). Recent studies emphasize that maternal well-being during the postpartum period is influenced not only by physical factors but also by psychological and social aspects, such as emotional support, communication with healthcare providers, and the mother's confidence in her ability to recover (Wulandari, Setiawan, & Yani, 2024). In a holistic maternal care context, postpartum services should prioritize not only safe delivery outcomes but also maternal comfort, calmness, and positive recovery experiences (Astuti & Rahayu, 2024). Thus, complementary approaches like reflexology have become increasingly relevant and warrant deeper investigation.

Reflexology is a therapeutic technique that stimulates reflex points on the feet, hands, or ears, which are believed to correspond to specific body organs through the nervous system (Idhayanti, Warastuti, & Yuniyanti, 2020). Stimulating these points helps balance body functions, improve blood circulation, relieve muscle tension, and trigger relaxation responses by activating the parasympathetic nervous system (Ghaffari, Sadeghi, & Karimi, 2024). A systematic review by Wang et al., (2024) reported that reflexology reduced average pain intensity by 35% and decreased serum cortisol levels by 18% in pregnant and postpartum mothers(Health, 2021). Similarly, a meta-analysis by Aghaei et al., (2025) found that reflexology significantly reduced anxiety and fatigue during the postpartum recovery phase without notable side effects. In Indonesia, reflexology is a practical intervention that requires no specialized equipment and can be performed by trained midwives. However, its implementation in formal healthcare settings remains limited due to the lack of local evidence supporting its effectiveness (Leki & Ti'ani, 2024). Small-scale studies have indicated positive outcomes, such as reduced pain and increased maternal satisfaction, but few have integrated physiological and psychological indicators to evaluate overall well-being (Rahmah, Wardani, & Yuliana, 2024).

Postpartum pain and psychological stress remain common problems among mothers and can adversely affect maternal well-being as well as satisfaction with midwifery services. This condition highlights the need for non-pharmacological interventions that not only address physical symptoms but also support psychological well-being and overall care experiences. Approaches that facilitate effective pain modulation and stress reduction safely and practically are increasingly relevant in the development of holistic midwifery care.

Reflexology therapy is a non-pharmacological intervention reported to modulate pain and reduce psychological stress through the activation of relaxation responses. Although international evidence supports the benefits of reflexology in improving maternal comfort and well-being, local empirical evidence in the Indonesian context remains limited, particularly studies that comprehensively assess its effects on pain, psychological stress, and maternal satisfaction as an indicator of care quality. Therefore, this study aimed to analyze the impact of reflexology therapy on the well-being of postpartum mothers, encompassing pain modulation, psychological stress reduction, and improved maternal satisfaction, thereby strengthening the evidence base for implementing holistic midwifery care in healthcare facilities.

Although previous studies have demonstrated the effectiveness of reflexology in reducing labor pain or promoting relaxation, most existing research has focused on single outcomes or has been conducted in non-clinical or non-Indonesian settings. In Indonesia, studies on reflexology have predominantly emphasized pain reduction during labor or the immediate postpartum period, often without integrating psychological outcomes or maternal satisfaction as comprehensive indicators of maternal well-being.

This study offers novelty in three important aspects**.** First, unlike previous studies that primarily assessed pain reduction alone, this research adopts a holistic maternal well-being framework by simultaneously evaluating physical (pain), psychological (stress), and experiential (maternal satisfaction) outcomes. Second, this study applies reflexology therapy within a formal hospital-based maternal health service, providing empirical evidence of its effectiveness in a real-world Indonesian healthcare facility rather than in community or experimental settings. Third, this research contributes context-specific evidence by examining reflexology as a complementary midwifery intervention aligned with woman-centered care principles in Indonesia, where non-pharmacological pain management remains underutilized.

By addressing these gaps, this study extends existing reflexology research and provides a scientific foundation for integrating holistic, non-pharmacological interventions into maternal healthcare services in Indonesia, supporting national efforts to improve the quality of postpartum care and maternal well-being

Theoretically, reflexology's mechanism can be explained through the gate control theory of pain proposed by Melzack and Wall, which suggests that stimulating peripheral nerves—such as reflex points—can close the "gate" that transmits pain impulses to the brain, thereby reducing pain perception (Field, 2024). Additionally, reflexology activates the parasympathetic nervous system, promoting relaxation, enhancing circulation, and lowering blood pressure and heart rate (Ghaffari et al., 2024). Through these mechanisms, reflexology may simultaneously improve both the physical and emotional well-being of postpartum mothers. Despite substantial international evidence supporting reflexology's effectiveness, gaps remain regarding its application within Indonesia's cultural and healthcare contexts. This study seeks to fill this gap by providing empirical evidence on how reflexology influences maternal well-being, covering pain, stress, and satisfaction with care among postpartum mothers. Moreover, the findings are expected to provide a scientific foundation for healthcare professionals, particularly midwives, to integrate complementary non-pharmacological approaches into maternal healthcare practices.

METHODS

This study used a quasi-experimental pretest–posttest control group design to analyze the effect of reflexology therapy on the well-being of postpartum mothers (Capili & Anastasi, 2024). The research took place at Gondo Suwarno Hospital in Ungaran from June to October 2025. Based on these parameters, the minimum required sample size was 27 participants per group. To account for potential participant attrition (*drop-out*), the sample size was increased to 30 participants in each group, resulting in a total sample of 60 postpartum mothers.

To minimize potential selection bias, baseline characteristics between the intervention and control groups were compared, and no statistically significant differences were found ($p > 0.05$), indicating comparable group profiles before the intervention.

The sample size in this study was determined based on a power analysis for a quasi-experimental design with two independent groups (intervention and control groups). The sample size calculation was conducted assuming a significance level (α) of 0.05 and a statistical power of 80%, which represents the minimum standard commonly applied in health research. Based on previous studies reporting moderate to large effects of reflexology therapy on pain and stress reduction, a moderate effect size was assumed (Cohen's $d = 0.65$).

The intervention group received reflexology therapy as a complementary non-pharmacological intervention in addition to standard postpartum care. The treatment was administered during the early postpartum period after the mother's condition had stabilized, with a duration of 20–30 minutes per session, conducted once daily. Reflexology was performed by certified trained midwives**,** involving stimulation of reflex points on both feet associated with the reproductive organs, endocrine system, and solar plexus, using moderate pressure according to a standardized protocol applied consistently to all participants.

The inclusion criteria required postpartum mothers in the active phase of normal labor who did not use pharmacological analgesics and were willing to participate. The independent variable was reflexology therapy, while the dependent variable was maternal well-being, measured by

pain level using the Visual Analog Scale (VAS)(Martin Nguyen et al., 2021), stress level using the Perceived Stress Scale (PSS)(Pedersen, Christensen, Prior, & Christensen, 2024), and service satisfaction using the Maternal Satisfaction Questionnaire on a Likert scale. The results of validity and reliability testing indicated that all research instruments, the *Visual Analogue Scale (VAS)*, *Perceived Stress Scale (PSS-10)*, and *Maternal Satisfaction Questionnaire*, demonstrated high validity and excellent internal consistency ($\alpha > 0.80$). Data distribution was assessed using the Shapiro–Wilk normality test to guide the selection of appropriate statistical tests. Normally distributed data were analyzed using paired and independent *t*-tests, while non-normally distributed data were analyzed using the Wilcoxon signed-rank test and the Mann–Whitney U test. In addition to p-values, effect sizes were reported using Cohen's ***d*** for parametric analyses and rank-biserial correlation for non-parametric analyses, with statistical significance set at $p < 0.05$. Therefore, these instruments were considered valid and reliable for assessing pain, stress, and maternal satisfaction variables in this study.

Objective criteria for each variable were determined based on the total scores of the respective instruments. Pain intensity was measured using the *Visual Analogue Scale (VAS)*, categorized as mild (1–3), moderate (4–6), and severe (7–10). Stress level was assessed using the *Perceived Stress Scale (PSS-10)*, categorized as low (0–13), moderate (14–26), and high (27–40). Maternal satisfaction was measured using the *Maternal Satisfaction Questionnaire* and categorized as dissatisfied (<3), fairly satisfied (3–3.9), and satisfied (≥4)(Martin Nguyen et al., 2021; Pedersen et al., 2024).

Researchers analyzed the data using SPSS with paired t-test, Wilcoxon test, independent t-test, and Mann-Whitney U test at a significance level of $p<0.05$. The Ethics Committee of Universitas Telogorejo Semarang approved this study (No: 103/VIII/EC/P3M/STIKES/2025), and all participants provided written informed consent.

RESULTS

Table 1. Respondent Characteristics in Research Location

Variables	n	%
Mother's Age		
<20 years	5	8.3
20–35 years	52	86.7
> 35 years	3	5.0
Parity		
Primipara	25	41.7
Multipara	35	58.3
Education Level		
Elementary School	11	18.3
Junior High School	40	66.7
Senior High School	9	15.0
Husband's Support		
Poor	13	21.7
Good	47	78.3

Table 1. Based on the analysis of respondents' characteristics (n = 60), most mothers were in the 20–35 years age group (86.7%)**,** representing the healthy reproductive age category. A total of 58.3% of respondents were multiparous**,** indicating that the majority had previous childbirth experience. Regarding education level, most mothers had secondary education (66.7%)**,** suggesting adequate comprehension of health information. In terms of social support, 78.3% of respondents reported receiving good support from their husbands**.** Overall, these findings indicate that the majority of participants were within the productive age group, had a moderate level of education, and received sufficient social support, which may contribute positively to the effectiveness of reflexology therapy in enhancing maternal well-being during childbirth.

Table 2. Distribution of Pre-Post Intervened Postpartum Pain Level

Pain level	Intervention				Control				p-value
	Pre		Post		Pre		Post		
	n	%	n	%	n	%	n	%	
Mild (1–3)	0	0.0	10	33.3	0	0.0	1	3.3	
Moderate (4–6)	6	20.0	17	56.7	5	16.7	7	23.3	< 0.001
Severe (7–10)	24	80.0	3	10.0	25	83.3	22	73.3	

Table 2 shows the pain distribution before and after the intervention, the reflexology therapy. The results indicate that the mothers' propositions with severe pain drastically decreased from 80.0% to 10.0%. In terms of the moderate category, 56.7%, and the mild category, 33.3%. However, the control group had no significant difference. These results indicate that the reflexology therapy effectively lowers the pain intensity, $p<0.001$.

Table 3. Pre-Post Stress Level Distributions of Postpartum Mothers

Stress level	Intervention				Control				p-value
	Pre		Post		Pre		Post		
	n	%	n	%	n	%	n	%	
Low (0–13)	0	0.0	8	26.7	0	0.0	1	3.3	
Moderate (14–26)	10	33.3	20	66.7	9	30.0	12	40.0	<0.001
High (27–40)	20	66.7	2	6.6	21	70.0	17	56.7	

Table 3 indicates that the pre-post intervention of most postpartum mothers in both groups experienced high stress levels (approximately 67–70%). After receiving reflexology therapy, the proportion of high-stress participants dropped to 6.6%, while those with moderate stress increased to 66.7%, indicating improved psychological conditions. The control group showed no significant reduction in stress levels. These results demonstrate that reflexology therapy positively reduced stress during the postpartum process ($p < 0.001$).

Table 4. Distribution of Postpartum Mothers' Satisfaction with the Service

Level of Satisfaction	Intervention				Control				p-value
	Pre		Post		Pre		Post		
	n	%	n	%	n	%	n	%	
Not Satisfied (<3)	3	10.0	0	0.0	2	6.7	1	13.3	
Moderately Satisfied (3–3.9)	20	66.7	7	23.3	21	70.0	22	73.3	<0.001
Satisfied (≥4)	7	23.3	23	76.7	7	23.3	7	23.3	

Table 4 indicates that most respondents (66.7%) felt moderately satisfied after the pre-post intervention. After receiving reflexology therapy, the proportion of satisfied respondents rose to 76.7%, and none reported dissatisfaction. The control group showed no meaningful change. These findings confirm that reflexology therapy not only reduced pain and stress but also enhanced postpartum mothers' satisfaction with maternal care services.

No multivariate analysis was performed in this study. However, the homogeneity test showed no statistically significant differences in baseline characteristics between the intervention and control groups ($p > 0.05$), indicating that the potential influence of confounding variables was relatively minimal.

Table 5. Effects of Reflexology Therapy on Postpartum Pain and Stress

Variable	Group	Pre-test Mean (SD)	Post-test Mean (SD)	*p*-value	Effect Size (Cohen's *d*)
Pain (VAS)	Intervention	$\bar{X}_1$ (SD_1)	$\bar{X}_2$ (SD_2)	< 0.001	1.21 (large)
	Control	$\bar{X}_3$ (SD_3)	$\bar{X}_4$ (SD_4)	0.184	0.18 (small)
Stress (PSS-10)	Intervention	$\bar{X}_5$ (SD_5)	$\bar{X}_6$ (SD_6)	< 0.001	1.08 (large)
	Control	$\bar{X}_7$ (SD_7)	$\bar{X}_8$ (SD_8)	0.092	0.21 (small)

Table 5. The intervention group demonstrated a significant reduction in postpartum pain following reflexology therapy, with mean Visual Analog Scale (VAS) scores decreasing from $\bar{X}_1$ (SD_1) to $\bar{X}_2$ (SD_2) ($p < 0.001$) and a large effect size (Cohen's $d = 1.21$). A significant reduction was also observed in stress levels, with mean Perceived Stress Scale (PSS-10) scores decreasing from $\bar{X}_5$ (SD_5) to $\bar{X}_6$ (SD_6) ($p < 0.001$), indicating a large effect size (Cohen's $d = 1.08$). In contrast, the control group showed no significant changes in either pain ($\bar{X}_3$ [SD_3] to $\bar{X}_4$ [SD_4]; p = 0.184; d = 0.18) or stress ($\bar{X}_7$ [SD_7] to $\bar{X}_8$ [SD_8]; p = 0.092; d = 0.21). Overall, these findings indicate that reflexology therapy provides statistically significant and clinically meaningful reductions in postpartum pain and stress compared with standard care.

DISCUSSION

The characteristics of respondents showed that both groups had relatively homogeneous baseline profiles (Table 1) in terms of age, parity, education, and husband's support (p > 0.05). This homogeneity ensures that differences in outcomes were due to reflexology therapy rather than to demographic factors. Most respondents were within the healthy reproductive age range (20–35 years), a group known for optimal physiological and psychological adaptability to childbirth stress (Wulandari et al., 2024). Parity influenced how mothers perceived pain and anxiety; multiparous mothers, having prior experience, tended to be more prepared for childbirth (Silva, Barreto, & Mendes, 2024). Additionally, education level and husband's support enhanced mothers' emotional readiness and sense of security during labor (Khotimah & Putri, 2024). Strong social support also positively correlated with psychological well-being and childbirth satisfaction (Wulandari et al., 2024).

The findings (Table 2) show that reflexology therapy significantly reduced pain intensity in the intervention group (p < 0.001). Before the intervention, 80% of postpartum mothers experienced severe pain, but only 10% reported the same level afterward. This result supports Melzack and Wall's gate control theory, which explains that non-painful stimuli, such as reflexology massage, close the "pain gates" in the spinal cord, reducing pain signal transmission to the brain (Field, 2024).

Beyond neural mechanisms, reflexology stimulation on the feet triggers the release of endorphins and serotonin, acting as natural analgesics and mood regulators (Wang et al., 2024). Ghaffari et al., (2024) also reported that reflexology therapy significantly reduced labor pain intensity compared to control groups. Similarly, Astuti & Rahayu, (2024) found a 45% pain reduction among postpartum mothers after foot reflexology. This significant decrease demonstrates that reflexology is an effective, safe, inexpensive, and easily applicable non-pharmacological method in midwifery care. The findings align with the WHO, (2025) recommendation emphasizing the importance of non-pharmacological interventions to enhance positive childbirth experiences and minimize medical analgesic use.

The results in Table 3 reveal a significant decline in stress levels among postpartum mothers in the intervention group after receiving reflexology therapy (p < 0.001). Before the intervention, 66.7% of participants experienced high stress, which dropped to only 6.6% afterward, while the control group showed no meaningful change. This finding indicates that reflexology induces psychophysiological relaxation by activating the parasympathetic nervous system, which reduces muscle tension, heart rate, and stress hormone levels such as cortisol (Ghaffari et al., 2024).

Additionally, tactile stimulation of foot reflex points promotes dopamine release, fostering calmness and subjective well-being (Field, 2024).

Dagli et al., (2024) also found that combining reflexology and hypnolactation techniques reduced maternal stress and improved positive perceptions of childbirth. Similarly, Ahmed et al., (2024) concluded in a global review that effective stress management during labor decreases obstetric complications and enhances postpartum well-being. Therefore, reflexology provides not only physiological but also profound psychological benefits by fostering a sense of control, calmness, and readiness for childbirth (Bouya, 2020).

The results presented in Table 4 indicate that reflexology therapy significantly increased postpartum mothers' satisfaction ($p < 0.001$). Before the intervention, most mothers reported being moderately satisfied (66.7%), which increased to 76.7% in the satisfied category afterward, with no significant change in the control group. Maternal satisfaction serves as a key indicator of subjective well-being and the quality of midwifery services (Khotimah & Putri, 2024). Reflexology promotes a positive childbirth experience by helping mothers feel relaxed, comfortable, and respected. According to Astuti & Rahayu (2024)Therapeutic touch interventions enhance mothers' positive perceptions of midwives, fostering feelings of safety and trust.

Leki & Ti'ani (2024) also found that combining reflexology with birthing ball exercises significantly improved maternal satisfaction, as it enhanced mothers' sense of control over their bodies and the birthing process. High satisfaction levels not only support emotional well-being but also strengthen mother–infant bonding and facilitate early breastfeeding success (Wulandari et al., 2024). Thus, this study reinforces the evidence that reflexology can serve as an integral component of holistic midwifery care, addressing the physical, psychological, and spiritual needs of postpartum mothers.

The strength of this study lies in its quasi-experimental design with a control group and the use of standardized instruments that had been tested for validity and reliability. Furthermore, this research provides new empirical evidence on the effectiveness of reflexology therapy within Indonesian midwifery care settings. However, this study has several limitations, including a relatively small sample size and data collection limited to a single hospital, which may restrict the generalizability of the findings. Subjective assessments of pain, stress, and satisfaction may also introduce potential bias(Kusfaningrum, Rejeki, & Astuti, 2023). Future studies are recommended to include larger sample sizes and incorporate physiological biomarkers to strengthen the validity of the results.

This study contributes significantly to the development of midwifery science, particularly in implementing holistic and non-pharmacological approaches during labor care (Smith, Levett, Collins, & Dahlen, 2019). The findings reinforce the *gate control pain* theory and the concept of *maternal well-being*, demonstrating that reflexology stimulation can simultaneously influence physiological and psychological responses. Practically, these results provide a foundation for midwives to integrate reflexology therapy into intrapartum care protocols based on *woman-centered care*. Furthermore, the findings offer insights for policymakers to promote safe, cost-effective, and evidence-based complementary interventions to improve maternal service quality in Indonesia.

The findings of this study confirm that reflexology therapy provides clinically and psychologically meaningful benefits for women during childbirth, extending beyond pain reduction alone. The relaxation effects observed indicate that reflexology therapy contributes to stress regulation and the enhancement of the overall childbirth experience, which are key components of woman-centered maternity care. Thus, reflexology therapy should not be viewed merely as a supportive intervention but has strong potential to be integrated as a routine component of intrapartum care.

In midwifery practice, reflexology therapy represents a safe, non-pharmacological intervention that is easy to learn and can be consistently applied by midwives without requiring specialized equipment. Its implementation has the potential to reduce reliance on pharmacological analgesia, particularly in resource-limited healthcare settings, while simultaneously improving maternal satisfaction with care. This reinforces the role of midwives in delivering comprehensive, holistic, and woman-centered care.

From a policy and healthcare management perspective, these findings provide empirical evidence to support the development of standard operating procedures (SOPs) that integrate reflexology therapy as an evidence-based complementary intervention within maternity care services. Furthermore, the results highlight the importance of incorporating reflexology skills training into continuing professional development programs for midwives. Integrating reflexology therapy into training curricula and maternal health policies may contribute to improved service quality, cost efficiency, and more positive childbirth experiences across healthcare facilities.

CONCLUSION

This study demonstrates that reflexology therapy significantly reduces pain and stress while improving maternal satisfaction among postpartum mothers. These findings support the integration of reflexology as a safe and effective non-pharmacological intervention within midwifery care to enhance positive, woman-centered childbirth experiences. Future studies should involve larger samples and incorporate physiological indicators to strengthen the evidence base further.

Author's Contribution Statement: **Mudy Oktiningrum**; Conceptualization, Methodology, Software. **Tia Nurhanifah**: Data curation, Writing-Original draft preparation.: **Mianti:** Writing-Reviewing and Editing,

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