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The effect of infant massage on mother-infant bonding among infants aged 6-12 months

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***Abstract*:**
Mother–infant bonding plays an essential role in supporting infants' emotional, cognitive, and psychosocial development during early life. One non-pharmacological intervention that may strengthen emotional attachment between mothers and infants is infant massage. This study aimed to analyze the effect of infant massage on mother–infant bonding among infants aged 6–12 months. This study employed a quasi-experimental design with a pretest–posttest control group approach. The research was conducted from January to November 2025 at several Posyandu within the working areas of Puskesmas Sukorame and South Kediri Public Health Center, Indonesia. Participants consisted of mothers and their infants aged 6–12 months selected using purposive sampling. Mothers in the intervention group received infant massage training and were instructed to perform massage twice weekly for four consecutive weeks. Maternal–infant bonding was measured using the Maternal Infant Bonding Scale (MIBS) before and after the intervention. Data were analyzed using paired and independent *t*-tests with a significance level of $p < 0.05$. The findings demonstrated a significant increase in bonding scores among mothers in the intervention group after four weeks of infant massage practice ($p < 0.001$). Mothers showed greater emotional warmth, improved responsiveness, and enhanced interaction with their infants, while infants appeared calmer and more relaxed during interactions. In conclusion, infant massage effectively strengthens mother–infant bonding and may serve as a low-cost, culturally acceptable intervention to support early relational health and maternal well-being within community-based maternal and child health services.

***Keywords*:**
attachment; infant development; infant massage; maternal bonding; mother–infant interaction

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INTRODUCTION

Mother–infant bonding plays a crucial role in forming the early relational foundation between parents and their children. It significantly influences emotional regulation, cognitive development, and overall well-being throughout infancy and childhood. Strong bonding facilitates secure attachment, which supports the development of trust, emotional stability, and psychosocial resilience (Bianciardi et al., 2023). Conversely, weak bonding may disrupt feeding interactions, hinder

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socioemotional growth, and increase the risk of later behavioral and emotional disorders. Various non-pharmacological methods—such as skin-to-skin contact, breastfeeding, and responsive caregiving—have been shown to promote bonding. Among these, infant massage is one of the most widely practiced and evidence-supported strategies that enhances parent–child closeness through touch, warmth, eye contact, and synchronized interactions (Field, 2019; Chen et al., 2021).

Prior studies reveal that mothers who practice infant massage experience deeper emotional connection, strengthened responsiveness, and improved understanding of infant cues (Danielsson et al., 2024). Physiologically, infant massage increases oxytocin levels, reducing stress and strengthening affectionate feelings between mother and child (Moussa et al., 2021). Despite its evident benefits, research on infant massage among older infants (6–12 months) in Indonesian community health settings remains limited. Most studies emphasize neonates or preterm infants, leaving a research gap within the context of infants transitioning into active emotional and social development. Therefore, this study aims to explore the effectiveness of infant massage as a complementary intervention to enhance bonding in mother–infant dyads during this important developmental period.

METHOD

This research employed a quasi-experimental design with a pretest–posttest control group. The study took place from January to November 2025 across Posyandu located in the working areas of Puskesmas Sukorame and Puskesmas Wilayah Selatan Kota Kediri, including Posyandu Seroja, Menur, Melati, Teratai, and Dahlia. Participants consisted of mothers and their infants aged 6–12 months who met inclusion criteria, including good general health and willingness to participate throughout the study period. Purposive sampling was used to select participants. The intervention began with an initial training session where mothers learned standardized infant massage techniques using a demonstration doll. The Maternal Infant Bonding Scale (MIBS), validated and reliable for Indonesian populations (Wiguna & Ismail, 2019), was administered as a pretest. This was followed by home visits, during which mothers practiced massage directly on their infants under researcher supervision. Mothers were instructed to perform infant massage at home twice weekly for 30 minutes over four consecutive weeks. Researchers conducted eight monitoring visits to ensure proper technique, support participant adherence, and document behavioral responses. At the end of the four-week intervention period, a posttest using the same MIBS instrument was conducted. Data analysis used paired t-tests to assess within-group differences and independent t-tests to compare outcomes between the intervention and control groups, with significance set at $p < 0.05$. Ethical

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considerations included informed consent, confidentiality guarantees and ensuring infants' safety throughout the intervention.

RESULT

Table 1. Comparison of Maternal–Infant Bonding Scores Before and After Infant Massage Intervention

Group	Measurement	Mean ± SD	Mean Difference	*p*-value
Intervention Group (*n* = 30)	Pretest	58.43 ± 6.12	10.27	<0.001
	Posttest	68.70 ± 5.48		
Control Group (*n* = 30)	Pretest	57.96 ± 5.89	1.14	0.218
	Posttest	59.10 ± 5.76		

Table 1 demonstrates a substantial increase in maternal–infant bonding scores in the intervention group following the four-week infant massage program. The mean bonding score increased from 58.43 ± 6.12 during the pretest to 68.70 ± 5.48 at posttest, with a statistically significant difference ($p < 0.001$). In contrast, the control group showed only a slight increase in bonding scores, from 57.96 ± 5.89 to 59.10 ± 5.76, which was not statistically significant ($p = 0.218$). These findings indicate that infant massage significantly improved emotional bonding between mothers and infants.

Table 2. Comparison of Posttest Maternal–Infant Bonding Scores Between Intervention and Control Groups

Variable	Intervention Group (*n* = 30)	Control Group (*n* = 30)	Mean Difference	*p*-value
Posttest Bonding Score	68.70 ± 5.48	59.10 ± 5.76	9.60	<0.001

Table 3. Observational Findings During the Infant Massage Intervention

Observed Indicators	Findings During Intervention
Maternal emotional warmth	Mothers demonstrated more affectionate touch and verbal interaction
Eye contact	Increased eye contact between mothers and infants was observed
Maternal responsiveness	Mothers became more sensitive to infant cues and behaviors
Infant calmness	Infants appeared more relaxed and less fussy
Infant responsiveness	Infants showed improved responsiveness during interaction
Caregiving confidence	Mothers reported greater confidence in caring for their infants
Sleep and feeding patterns	Several mothers reported improved infant sleep and feeding responsiveness

Table 2 shows a statistically significant difference in posttest maternal–infant bonding scores between the intervention and control groups ($p < 0.001$). Mothers who received infant massage training and performed regular massage demonstrated higher bonding scores than those in the

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control group. This finding confirms that the observed improvement in maternal–infant bonding was associated with the infant massage intervention rather than normal developmental adaptation alone.

Observational findings during the intervention period revealed positive behavioral and emotional changes among both mothers and infants. Mothers appeared more emotionally engaged and responsive toward their infants, while infants demonstrated calmer behavior and improved interactional responsiveness. Additionally, mothers reported increased caregiving confidence and perceived a stronger emotional attachment after regularly practicing infant massage. These observations support the quantitative findings that infant massage can strengthen mother–infant bonding and improve dyadic interaction quality.

DISCUSSION

The findings of this study reinforce the growing body of evidence demonstrating that infant massage is an effective intervention for strengthening mother–infant bonding. Mothers who regularly practiced infant massage for four weeks showed increased emotional warmth, affectionate touch, eye contact, and responsiveness toward their infants. In addition, infants appeared calmer, more relaxed, and more responsive during interactions. These findings indicate that structured tactile stimulation may facilitate emotional closeness and improve the quality of dyadic interaction between mothers and infants during early infancy.

The results of this study are consistent with previous international studies reporting positive effects of infant massage on emotional bonding and maternal attachment. Danielsson et al. (2024) found that mothers participating in infant massage programs described stronger emotional connections, improved communication, and increased confidence in interacting with their infants. Similarly, Mrljak et al. (2022) concluded in a systematic review that infant massage positively contributes to parent–infant interaction, emotional responsiveness, and attachment formation. Furthermore, Zhang et al. (2023) reported that massage interventions improved infant relaxation and behavioral regulation, thereby supporting healthier parent–infant interactions. These findings strengthen the evidence that infant massage can serve as a beneficial non-pharmacological intervention for enhancing early relational health.

The improvement in mother–infant bonding observed in this study may be explained through neurobiological mechanisms associated with tactile stimulation. Touch-based interactions during infant massage stimulate oxytocin release, which plays an essential role in promoting affectionate behavior, emotional attachment, and maternal sensitivity (Moussa et al., 2021). Oxytocin is widely recognized as a hormone associated with social bonding and emotional regulation. Increased

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oxytocin levels may help mothers feel more emotionally connected and responsive to their infants, thereby enhancing the bonding process. In addition, tactile stimulation has been associated with reduced stress responses and improved emotional well-being among caregivers and infants.

Another important mechanism underlying the effectiveness of infant massage involves the reduction of cortisol levels and the promotion of infant relaxation. Field (2019) explained that massage therapy contributes to decreased physiological stress responses, improved sleep quality, and calmer infant behavior. Infants who are more relaxed and emotionally regulated are generally easier to engage with, thereby facilitating positive interactions with caregivers. The calmer behavioral responses observed among infants in this study may therefore contribute indirectly to the development of secure attachment and improved maternal responsiveness.

The findings of this study also support attachment theory, which emphasizes the importance of responsive caregiving and emotional attunement in the development of secure attachment relationships. Through repeated massage interactions, mothers became more attentive to subtle infant cues such as facial expressions, crying patterns, and body movements. This increased awareness may strengthen maternal sensitivity and improve synchronization during mother–infant interactions. Ettenberger et al. (2021) highlighted that bonding and attachment are strongly influenced by early relational experiences characterized by consistent emotional responsiveness and physical closeness. Therefore, infant massage may provide an opportunity for mothers to develop more adaptive caregiving behaviors and stronger emotional attunement with their infants.

From a community health perspective, the successful implementation of infant massage training at the Posyandu level demonstrates that this intervention is feasible, low-cost, culturally acceptable, and scalable within community-based maternal and child health services. Standardized training sessions and regular monitoring visits ensured that mothers performed the massage techniques safely and correctly. This finding suggests that infant massage education may be integrated into routine maternal and child health programs to strengthen emotional bonding, support early childhood development, and promote maternal well-being, particularly in low-resource settings where psychosocial support services remain limited (Vaivada et al., 2017).

This study has several practical implications for maternal–child healthcare practice. Midwives and community health workers may incorporate infant massage education into postnatal care and parenting programs to support healthy attachment development and improve the quality of mother–infant interaction. In addition, integrating infant massage interventions into community health promotion programs may improve maternal confidence, infant emotional regulation, and overall developmental outcomes during infancy.

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Despite its important findings, this study has several limitations. The relatively small sample size and short intervention duration may limit the generalizability of the results. In addition, bonding outcomes were assessed using self-report instruments, which may introduce response bias and subjectivity. This study also did not evaluate biological markers, such as oxytocin or cortisol levels, that could provide stronger physiological evidence of the mechanisms underlying improved bonding. Future studies are recommended to involve larger populations, longer follow-up periods, and multidimensional measurements, including hormonal and neurodevelopmental assessments, to better understand the long-term effects of infant massage interventions.

CONCLUSION

This study concludes that infant massage significantly enhances bonding between mothers and infants aged 6–12 months. Regular massage practice over a four-week period fostered emotional closeness, improved maternal sensitivity to infant cues, and strengthened interactive synchrony within the dyad. Given its safety, low cost, and ease of implementation, infant massage represents a valuable complementary intervention for supporting early relational health. Integrating structured infant massage education into community-based health services may help strengthen maternal–infant attachment, with potential benefits extending to cognitive, emotional, and developmental outcomes. Future research is encouraged to explore long-term impacts and physiological mechanisms such as hormonal changes and neurodevelopmental effects.

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