

The Effect of Infant Massage on Mother-Infant Bonding Among Infants Aged 6-12 Months

Ririn Indriani¹, Finta Isti Kundarti¹



¹ Applied Bachelor Midwifery Study Program, Kediri, Poltekkes
Kemenkes Malang, Indonesia

Correspondence should be addressed to:
Ririn Indriani
ririnindrianimiori79@gmail.com

Abstract:

Mother–infant bonding is a fundamental component of early emotional development and has long-term effects on infants' behavioral, psychological, and neurodevelopmental outcomes. Infant massage is widely recognized as a complementary intervention that promotes parent–child interaction, facilitates emotional closeness, and enhances touch-mediated communication between mothers and infants. This study aims to investigate the effect of infant massage on bonding among infants aged 6–12 months. This research employed a quasi-experimental design with a pretest–posttest control group. The intervention included structured training using standardized massage techniques, followed by four weeks of home-based practice. Bonding was measured using the Maternal Infant Bonding Scale (MIBS) before and after the intervention. Data analysis used paired t-tests to assess within-group differences and independent t-tests to compare outcomes between the intervention and control groups. The results showed a significant improvement in bonding scores among mothers in the intervention group p -value = 0.011, with apparent differences compared to the control group. Observational data revealed enhanced maternal sensitivity, increased affectionate behavior, and greater emotional attunement. These findings suggest that infant massage is a practical, low-cost, and feasible intervention that can be effectively integrated into community-based maternal and child health programs to promote emotional attachment and support early developmental outcomes.

Article info:

Submitted:
16-11-2025
Revised:
06-12-2025
Accepted:
10-12-2025

Keywords:

infant massage, mother-infant bonding, MIBS

DOI: <https://doi.org/10.53713/htechj.v4i1.565>

This work is licensed under CC BY-SA License.



INTRODUCTION

Mother–infant bonding is a foundational element of early human development, shaping a child's emotional, cognitive, and social growth (Le Bas et al., 2022). This reciprocal process, characterized by affective attunement, mutual responsiveness, and emotional synchrony, lays the groundwork for secure attachment, which is vital for healthy psychological functioning throughout life (Grochowska et al., 2024). Robust bonding enables infants to develop a sense of safety and trust, facilitating exploration, emotional regulation, and the formation of adaptive interpersonal relationships (Clarici et al., 2024). Conversely, compromised bonding has been linked to feeding difficulties, impaired socioemotional development, and heightened vulnerability to behavioral and emotional disturbances in later childhood and beyond (Vizzari et al., 2023).

A range of non-pharmacological, caregiver-mediated interventions has been shown to foster this critical bond. Among them, skin-to-skin contact, responsive caregiving, and breastfeeding are well-documented for their positive influence on maternal sensitivity and infant security (Hart, 2022). In recent decades, infant massage has emerged as a remarkably accessible and culturally adaptable

practice that integrates touch, eye contact, vocal soothing, and rhythmic interaction as key components of bonding behavior (Nousia, 2023; Agustina et al., 2022). Through structured, gentle tactile stimulation, infant massage not only promotes physiological regulation in the infant but also enhances maternal confidence, attentiveness, and emotional engagement (La Rosa et al., 2024; Rahmawati et al., 2024).

From a neurobiological perspective, infant massage has been associated with measurable changes in key hormonal systems (Lai et al., 2022). Studies indicate that tactile stimulation during massage increases oxytocin secretion, the “bonding hormone”, in both mothers and infants, thereby reducing cortisol levels and attenuating stress responses (Nikolaeva et al., 2024). This biochemical shift supports feelings of calm, warmth, and affection, reinforcing the emotional connection between caregiver and child (Geary et al., 2023). Additionally, the interactive nature of massage sessions encourages dyadic synchrony, in which maternal cues and infant responses become increasingly attuned, further strengthening relational security (Carozza & Leong, 2021).

Despite compelling evidence supporting infant massage in neonatal and early postpartum contexts, including its use with preterm and low-birth-weight infants, there remains a notable gap in research focusing on older infants aged 6–12 months. This developmental window is marked by significant milestones: increased mobility, emerging social communication, and the consolidation of attachment patterns. In many low- and middle-income settings, including Indonesia, community-based postnatal care often extends beyond the immediate newborn period, yet interventions targeting bonding during later infancy remain underexplored. Understanding how infant massage may support mother–infant relationships during this dynamic phase is both timely and clinically relevant (Mrljak et al., 2022).

Therefore, this study seeks to investigate the effectiveness of infant massage as a complementary, non-invasive intervention to enhance mother–infant bonding among dyads with infants aged 6–12 months within Indonesian community health settings. By addressing this underrepresented age group and context, the research aims to provide empirical evidence to inform the development of culturally appropriate, scalable parenting support programs. Ultimately, strengthening early relational bonds through simple, low-cost practices, such as infant massage, may offer a powerful avenue for promoting lifelong mental health and developmental resilience (Khuzaiyah et al., 2022).

METHOD

This study employed a quasi-experimental design with a pretest–posttest control group to examine the effect of infant massage on mother–infant bonding among infants aged 6–12 months. The research was conducted between January and November 2025 across five integrated health posts (Posyandu), namely Seroja, Menur, Melati, Teratai, and Dahlia, located within the operational areas of Puskesmas Sukorame and Puskesmas Wilayah Selatan in Kota Kediri, East Java, Indonesia. These community-based primary healthcare centers were selected for their active maternal and child health programs and their accessibility to the target population. The setting provided a culturally appropriate and ecologically valid context for implementing and evaluating a community-oriented intervention.

Participants were recruited using purposive sampling and consisted of mother–infant dyads that met specific inclusion criteria: infants aged 6–12 months, both the mother and infant in good general health, and the mother's willingness and availability to participate consistently throughout the study period. Mothers in the intervention group received a standardized training session on infant massage techniques, demonstrated by trained researchers using a baby doll. Following this

orientation, they were instructed to perform a massage on their infants at home twice weekly for 30 minutes over four consecutive weeks. To ensure fidelity and safety, researchers conducted 8 scheduled home visits, 2 per week, to supervise massage practice, provide corrective feedback, reinforce adherence, and observe the infant's behavioral responses in real time. The control group received routine Posyandu services without the infant massage intervention.

The primary outcome measure was mother–infant bonding, assessed using the Maternal Infant Bonding Scale (MIBS), a validated and culturally adapted instrument with demonstrated reliability in Indonesian populations. The MIBS was administered to all participants as a pretest before the intervention began and again as a posttest upon completion of the four weeks. This tool captures maternal affective and cognitive dimensions of bonding, enabling quantitative evaluation of changes attributable to the intervention. Ethical approval for the study was granted by the Ministry of Health of the Polytechnic of Malang. Ethical safeguards included obtaining written informed consent from all mothers, guaranteeing data confidentiality, and prioritizing infant safety and comfort throughout the massage sessions; any signs of infant distress prompted immediate cessation of the activity.

Data were analyzed using SPSS version 26.0. Within-group changes in bonding scores from the pretest to the posttest were evaluated using paired t-tests. In contrast, between-group differences (intervention vs. control) at the posttest were assessed using independent t-tests. Statistical significance was defined as $p < 0.05$. This analytical approach enabled the researchers to assess both the internal effectiveness of the massage intervention and its comparative impact in relation to standard care. The rigorous monitoring protocol, combined with validated measurement and ethical oversight, enhanced the study's internal validity and applicability to community health practice in similar low-resource settings.

RESULT

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics	Intervention Group (n=20)		Control Group (n=20)		p-value
	Mean	SD	Mean	SD	
Mother's					
Maternal Age	31.8	6.028	31.1	5.379	0.777 ^a
	<i>n</i>	%	<i>n</i>	%	
Education					0.663 ^a
Basic	2	10%	2	10%	
Intermediate	16	80%	13	65%	
Higher	2	10%	5	25%	
Occupation					0.609 ^a
Housewife	15	75%	16	80%	
Private Sector	3	15%	0	0%	
Entrepreneur	2	10%	4	20%	
Infant's					
Sex					1.000 ^a
Female	9	45%	9		
Male	11	55%	11		
	Mean	SD	Mean	SD	
Infant Age	9.90	2.149	9.60	1.930	0.517 ^a
Infant Weight (gram)	8.330	894.4	8.210	945.8	0.700 ^a
Bonding	3.30	0.801	4.00	0.918	0.801 ^a

^aLevene Test

Table 2. Bonding Before and After in the Intervention Group

Variable	Pretest	Posttest	p-value
	Mean ± SD	Mean ± SD	
Bonding	4.15 ± 1.182	3.30 ± 0.801	0.011

Table 2 displays the results of the Wilcoxon test for changes in mother-infant bonding scores in the intervention group before and after infant massage. Based on the analysis, the mean bonding score (\bar{x}) before the intervention (pretest) was 4.15 with a standard deviation of 1.182. After the intervention (posttest), the mean score (\bar{x}) decreased to 3.30 with a standard deviation of 0.801.

The Wilcoxon test was used to measure the significance of differences in two paired measurements within a single group. The test results showed a p-value of 0.011, indicating a statistically significant difference between the pretest and posttest scores ($p < 0.05$). It is worth noting that lower scores on the bonding scale indicate greater emotional closeness between the mother and infant. Therefore, the decrease in scores after the intervention can be interpreted as an increase in bonding quality, indicating that bonding improved following infant massage in the intervention group.

Table 3. Bonding Before and After in the Control Group

Variable	Pretest	Posttest	p-value
	Mean ± SD	Mean ± SD	
Bonding	4.10 ± 1.119	4.00 ± 0.918	0.317

Table 3 presents the results of the Wilcoxon test for mother–infant bonding scores in the control group, comparing scores before and after standard care. Based on the measurements, the mean bonding score before the intervention was 4.10 (standard deviation = 1.119) and decreased slightly to 4.00 (standard deviation = 0.918) after the intervention. The Wilcoxon test yielded a p-value of 0.317 ($p > 0.05$), indicating no significant difference between the pretest and posttest bonding scores in the control group. Based on Table 3, the p-value for significance is 0.011, indicating a statistically significant increase in bonding after baby massage was administered in the intervention group.

DISCUSSION

Baby massage can enhance bonding between the mother and infant by fostering direct touch, full attention, and warm interaction. When the mother massages the baby, skin-to-skin contact occurs, which strengthens emotional closeness. During the massage process, the mother typically talks, smiles, or makes eye contact with the baby, which helps the baby feel safe, loved, and cared for. This creates nonverbal communication that is very important in building the baby's trust in the mother. In addition, massage routines become special moments that strengthen the relationship because the baby feels comfortable and the mother becomes more focused on responding to the baby's needs. The more often it is done, the more it helps form a strong emotional bond between mother and baby from an early age.

Other studies show that massage therapy can significantly strengthen the bond between mothers and their babies. This is evidenced by very small p-values (<0.00001), indicating that the likelihood of the results occurring by chance is minimal. In other words, massage therapy has been scientifically proven to increase emotional closeness between mothers and babies (Zhang et al., 2023). Another study in Sweden found that mothers who received infant massage training from child

health nurses in health services reported that the relationships created through baby massage brought more happiness, tenderness, and security to their children (Danielsson et al., 2024).

In another study, massage was used in a randomized controlled trial, conducted with infants aged 3–6 months, with 30 participants in the intervention group and 30 in the control group. The massage was performed daily by mothers for one whole month. Meanwhile, the present study employed a quasi-experimental design, conducted on infants aged 6–12 months, with a sample of 20 in the intervention group and 20 in the control group, and was performed twice a week for a period of one month. Thus, the difference between this study and previous studies lies in the design, which is scientifically superior because it utilizes randomization, resulting in more valid and less biased findings. However, when randomization is not feasible, a quasi-experimental pretest–posttest control group design remains a suitable and practical choice for field settings.

The results of this study reinforce the growing body of evidence indicating that infant massage is a powerful, non-pharmacological tool for enhancing mother–infant bonding. Consistent with qualitative findings by Danielsson et al. (2024), in which mothers described deepened emotional connections after receiving infant massage training, participants in the current study similarly reported heightened feelings of closeness, responsiveness, and mutual enjoyment during interactions with their infants. These subjective experiences were mirrored in significant improvements on the Maternal Infant Bonding Scale (MIBS), underscoring the tangible psychological benefits of structured tactile engagement. The act of massage encouraged mothers to spend dedicated, distraction-free time with their infants, creating a shared space for emotional exchange and connection.

Biologically, the observed improvements in bonding can be partially explained by the neurohormonal effects of touch. As noted by Moussa et al. (2021), skin-to-skin contact and gentle massage stimulate oxytocin release, the so-called "bonding hormone," in both mothers and infants. This neurochemical response not only fosters feelings of warmth, trust, and affection but also reduces anxiety and promotes calmness in the dyad. Concurrently, infant massage has been shown to lower cortisol levels, a key stress hormone, in both infants and their caregivers (Field, 2019). This physiological shift fosters a low-stress, nurturing environment conducive to the formation of secure attachment, a cornerstone of healthy socioemotional development in infancy.

Furthermore, the findings align with recent systematic reviews highlighting the multifaceted benefits of infant massage. Geary et al. (2023) and Zhang et al. (2023) concluded that massage interventions consistently promote responsive parenting, improve infant sleep and digestion, reduce crying, and enhance overall parent–child synchrony. In this study, mothers not only reported increased confidence in caregiving but also demonstrated greater attentiveness to their infants' behavioral signals during massage sessions. This heightened sensitivity allowed them to interpret and respond more effectively to cues such as gaze aversion, cooing, or limb movements, key components of early communicative development and emotional reciprocity.

From a theoretical standpoint, these outcomes align closely with attachment theory, which posits that consistent, sensitive, and responsive caregiving is crucial for the development of secure infant attachment. By encouraging mothers to engage in sustained, attuned interactions, infant massage served as a practical vehicle for fostering the emotional attunement central to this framework. The intervention effectively transformed routine caregiving moments into opportunities for relational deepening, reinforcing the mother's role as a secure base from which the infant can explore the world. This process not only benefits the infant but also enhances maternal self-efficacy and emotional well-being (Norman & Roggman, 2025).

Notably, the successful delivery of this intervention within the Posyandu, a cornerstone of Indonesia's community health infrastructure, demonstrates its feasibility as a scalable, low-cost

strategy for promoting early relational health in resource-limited settings. The use of standardized training protocols and regular home-based monitoring ensured technique fidelity and infant safety, while the culturally familiar context of Posyandu facilitated maternal engagement and acceptance. Integrating infant massage education into routine maternal and child health services could thus serve as a sustainable public health approach to strengthening early bonding, supporting infant development, and addressing gaps in psychosocial support for mothers, particularly in regions where formal mental health resources are scarce (McCarty et al., 2023).

CONCLUSION

This study concludes that infant massage significantly enhances bonding between mothers and infants aged 6 to 12 months. Regular massage practice over four weeks 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.

ACKNOWLEDGEMENT

The authors extend sincere appreciation to Puskesmas Sukorame, Puskesmas Wilayah Selatan Kota Kediri, Posyandu staff, participating mothers and infants, academic supervisors, and all individuals who contributed to the successful implementation of this research.

REFERENCES

- Agustina, R., Novelia, S., & Kundaryanti, R. (2022). The Effect of Baby Massage on The Sleep Duration of Infants Aged 6-12 Months. *Nursing and Health Sciences Journal (NHSJ)*, 2(4), 361–366. <https://doi.org/10.53713/nhs.v2i4.147>
- Carozza, S., & Leong, V. (2021). The Role of Affectionate Caregiver Touch in Early Neurodevelopment and Parent–Infant Interactional Synchrony. *Frontiers in Neuroscience*, 14, 613378. <https://doi.org/10.3389/fnins.2020.613378>
- Clarici, A., Bulfon, M., Radin, Y., & Panksepp, J. (2024). Neuromodulation of safety and surprise in the early stages of infant development: Affective homeostatic regulation in bodily and mental functions. *Frontiers in Psychology*, 15, 1395247. <https://doi.org/10.3389/fpsyg.2024.1395247>
- Danielsson, M., Lustig, H. H., Garmy, P., & Einberg, L. (2024). Mothers' experience of infant massage in child health care: A qualitative interview study. *Nursing Open*, 11(6), e2206. <https://doi.org/10.1002/nop2.2206>
- Field T. (2019). Pediatric Massage Therapy Research: A Narrative Review. *Children (Basel, Switzerland)*, 6(6), 78. <https://doi.org/10.3390/children6060078>
- Geary, O., Grealish, A., & Bright, M. (2023). The effectiveness of mother-led infant massage on symptoms of maternal postnatal depression: A systematic review. *PLOS ONE*, 18(12), e0294156. <https://doi.org/10.1371/journal.pone.0294156>
- Grochowska, A., Kmita, G., Szumiał, S., & Rutkowska, M. (2024). Maternal affective touch and adaptive synchrony in mother-preterm infant interactions: Implications for early bonding processes. *Infant Behavior and Development*, 77, 102002. <https://doi.org/10.1016/j.infbeh.2024.102002>

- Hart, S. L. (2022). Attachment and Caregiving in the Mother–Infant Dyad: Evolutionary Developmental Psychology Models of their Origins in the Environment of Evolutionary Adaptedness. In *Evolutionary Perspectives on Infancy* (pp. 135-160). Springer International Publishing. https://doi.org/10.1007/978-3-030-76000-7_7
- Khuzaiyah, S., Adnani, Q. E. S., Chabibah, N., Khanifah, M., & Lee, K. Y. (2022). A qualitative study on mothers' experiences attending an online infant massage class: "It is funny! I feel close to my baby!". *BMC nursing*, 21(1), 175. <https://doi.org/10.1186/s12912-022-00952-9>
- La Rosa, V. L., Geraci, A., Iacono, A., & Commodari, E. (2024). Affective Touch in Preterm Infant Development: Neurobiological Mechanisms and Implications for Child–Caregiver Attachment and Neonatal Care. *Children*, 11(11). <https://doi.org/10.3390/children11111407>
- Lai, M., D'Acunto, G., Guzzetta, A., Finnigan, S., Ngenda, N., Ware, R. S., Boyd, R. N., & Colditz, P. B. (2022). Infant massage and brain maturation measured using EEG: A randomised controlled trial. *Early Human Development*, 172, 105632. <https://doi.org/10.1016/j.earlhumdev.2022.105632>
- Le Bas, G., Youssef, G., Macdonald, J. A., Teague, S., Mattick, R., Honan, I., McIntosh, J. E., Khor, S., Rossen, L., Elliott, E. J., Allsop, S., Burns, L., Olsson, C. A., & Hutchinson, D. (2022). The Role of Antenatal and Postnatal Maternal Bonding in Infant Development. *Journal of the American Academy of Child & Adolescent Psychiatry*, 61(6), 820-829.e1. <https://doi.org/10.1016/j.jaac.2021.08.024>
- McCarty, D. B., Willett, S., Kimmel, M., & Dusing, S. C. (2023). Benefits of maternally-administered infant massage for mothers of hospitalized preterm infants: a scoping review. *Maternal Health, Neonatology and Perinatology*, 9(1), 6. <https://doi.org/10.1186/s40748-023-00151-7>
- Moussa, S., Fawaz, L., Ibrahim, W., Elsayed, M. F., & Ahmed, M. M. (2021). Effect of Infant Massage on Salivary Oxytocin Level of Mothers and Infants with Normal and Disordered Bonding. *Journal of Primary Care & Community Health*, 12, 21501327211012942. <https://doi.org/10.1177/21501327211012942>
- Mrljak, R., Danielsson, A. A., Hedov, G., Garmy, P., Mrljak, R., Danielsson, A. A., Hedov, G., & Garmy, P. (2022). Effects of Infant Massage: A Systematic Review. *International Journal of Environmental Research and Public Health*, 19(11). <https://doi.org/10.3390/ijerph19116378>
- Nikolaeva, E. I., Dydenkova, E. A., Mayorova, L. A., & Portnova, G. V. (2024). The impact of daily affective touch on cortisol levels in institutionalized & fostered children. *Physiology & Behavior*, 277, 114479. <https://doi.org/10.1016/j.physbeh.2024.114479>
- Norman, V. J., & Roggman, L. A. (2025). Effects of infant massage on infant attachment security in a randomized controlled trial. *Infant Behavior and Development*, 78, 102004. <https://doi.org/10.1016/j.infbeh.2024.102004>
- Nousia, A. (2023). Healthy touch and infant massage: Two main factors in infants daily care and healthy development. *European Journal of Education Studies*, 10(6). <http://dx.doi.org/10.46827/ejes.v10i6.4854>
- Rahmawati, Rukmaini, & Novelia, S. (2024). The Effect of Baby Massage on Body Weight and Sleep Quality of Babies Aged 3-6 Months. *Health and Technology Journal (HTechJ)*, 2(2), 150–156. <https://doi.org/10.53713/htechj.v2i2.172>
- Vizzari, G., Morniroli, D., Travella, P., Bezze, E., Sannino, P., Rampini, S., Marchisio, P., Plevani, L., Mosca, F., & Gianni, M. L. (2023). Feeding Difficulties in Late Preterm Infants and Their Impact on Maternal Mental Health and the Mother–Infant Relationship: A Literature Review. *Nutrients*, 15(9). <https://doi.org/10.3390/nu15092180>
- Zhang, Y., Duan, C., Cheng, L., & Li, H. (2023). Effects of massage therapy on preterm infants and their mothers: A systematic review and meta-analysis of randomized controlled trials. *Frontiers in Pediatrics*, 11, 1198730. <https://doi.org/10.3389/fped.2023.1198730>