

The Effect of Infant Massage on Appetite in Infants Aged 6-12 Months

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ABSTRACT

Appetite is an important factor influencing infant growth and development. Infant massage has been reported as a complementary intervention that may improve feeding behavior and appetite in infants. This study aimed to determine the effect of infant massage on appetite among infants aged 6–12 months. This study employed a quasi-experimental pretest–posttest control group design. Forty infants were recruited through purposive sampling and divided into intervention (n=20), control (n=20) groups. The study was conducted in the working areas of the Sukorame Public Health Centres and the South Region Public Health Centre of Kediri City, from May 18 to June 18, 2025. The intervention group received infant massage twice weekly for four weeks, while the control group received standard care. Appetite was assessed using the Child Eating Behaviour Questionnaire (CEBQ). Data were analyzed using appropriate non-parametric statistical tests with a significance level of $p < 0.05$. Appetite scores increased significantly in the intervention group from 94.6 to 97.6 ($p = 0.004$), whereas no significant change was observed in the control group ($p = 0.336$). Infant massage administered twice weekly for four weeks significantly improved appetite among infants aged 6–12 months and may be considered a safe complementary intervention to support infant feeding and growth.

INTRODUCTION

Infant undernutrition, particularly underweight conditions, remains a significant public health challenge in Indonesia. According to the World Health Organization (WHO) (2022), the global prevalence of underweight among children under five years of age reached 15.4% (UNICEF et al., 2023). In Indonesia, the prevalence was reported at 7.8%, while East Java and Kediri City recorded prevalences of

11.3% and 10%, respectively (Dinas Kesehatan Kota Kediri, 2024). These figures indicate that undernutrition continues to be a major concern requiring effective preventive and management strategies. One of the primary factors contributing to underweight conditions in infants is inadequate nutritional intake resulting from poor appetite.

Appetite plays a crucial role in infant growth and development (Chen et



al., 2021). Adequate appetite enables infants to achieve optimal nutritional intake, which directly supports healthy weight gain and nutritional status (Lindholm et al., 2020). Conversely, appetite disorders may negatively affect physical growth (Tang et al., 2023), visual-spatial ability (Alam et al., 2020), and motor development (Ekholuenetale et al., 2020). Furthermore, poor appetite has been associated with an increased risk of infection and morbidity (Soliman et al., 2021). Therefore, improving appetite is essential to support optimal growth and overall health during infancy.

Various interventions have been implemented to improve appetite in infants, including pharmacological and non-pharmacological approaches. Pharmacological interventions, such as multivitamin supplementation, may produce side effects when used for extended periods (Sari et al., 2024). In contrast, infant massage has emerged as a promising non-pharmacological intervention due to its safety, simplicity, and potential benefits. Infant massage is believed to stimulate the vagus nerve and enhance gastric motility, thereby improving digestive function and

promoting appetite (Zhang et al., 2023). Previous studies have also reported no significant adverse effects associated with massage interventions (Liao et al., 2021). In addition, involving parents in infant massage sessions may strengthen parent–infant interactions (Priyadarshi et al., 2022), improve maternal confidence and attitudes toward physical contact with infants (Geary et al., 2023), enhance mother–infant bonding (Bhal, 2022), and improve parents’ ability to understand infant cues (Hartanti et al., 2021). These benefits may contribute positively to infants’ social and emotional development (Vimala McClure, 2017).

Although previous studies have demonstrated the benefits of infant massage for improving infant health and development, most research has primarily focused on outcomes such as weight gain, sleep quality, relaxation, and parent–infant bonding. Evidence specifically examining the effect of infant massage on appetite among infants aged 6–12 months remains limited. Furthermore, studies investigating appetite as a primary outcome while simultaneously involving parents in the intervention



process are still scarce. This gap highlights the need for further investigation regarding the effectiveness of infant massage in improving appetite among infants.

Therefore, this study aimed to determine the effect of infant massage on appetite among infants aged 6–12 months. The findings of this study are expected to provide scientific evidence supporting the use of infant massage as a complementary intervention to improve appetite and contribute to the prevention of nutritional problems during infancy.

RESEARCH METHODS

Research Design: This study employed a quantitative quasi-experimental approach using a pretest–posttest control group design. The intervention group received infant massage, whereas the control group received standard care without infant massage. The study was conducted in the working areas of the Sukorame Public Health Center and the South Region Public Health Center of Kediri City, East Java, from May 18 to June 18, 2025.

Population and Sample: The

population consisted of infants aged 6–12 months living in the study area. Using purposive sampling, 40 eligible infants were recruited and equally allocated into an intervention group ($n = 20$) and a control group ($n = 20$). Inclusion criteria included healthy infants aged 6–12 months and parents willing to participate in infant massage training and provide informed consent. Infants with medical conditions affecting appetite or growth, participants who did not comply with the protocol, or those who withdrew during the study were excluded. To minimize confounding factors, participants in both groups were selected using the same eligibility criteria.

Research Instrument: Appetite was assessed using the Child Eating Behaviour Questionnaire (CEBQ), which demonstrated acceptable validity ($r > 0.514$) and reliability (Cronbach's $\alpha = 0.752$) (Anggraini et al., 2021). The questionnaire consists of 35 items, with higher scores indicating better appetite. Body weight was also measured to support appetite assessment (Olwy et al., 2023).

Research Procedure: Mothers in



the intervention group received infant massage training from health personnel and subsequently performed infant massage at home twice weekly for 30 minutes over four weeks. This duration was supported by previous studies reporting improvements in feeding behavior and appetite following regular infant massage (Lestari et al., 2021; Zhang et al., 2023). Appetite was measured before (pretest) and after (posttest) the intervention using the CEBQ. In this study, the CEBQ was completed by mothers based on their observations of infants' feeding behaviours and appetite-related responses during daily feeding activities. Previous studies have also used the CEBQ as a parent-reported measure to assess appetitive traits and their relationship with growth trajectories from infancy to childhood, supporting its use in observing early eating behaviours (Anggraini et al., 2021). The control group received standard health education without infant massage.

Data Analysis: Data were analyzed using IBM SPSS Statistics version 31. Normality and homogeneity were assessed using the Shapiro–Wilk and Levene's tests, respectively. The Wilcoxon Signed Rank Test was used to compare pretest and posttest scores within groups, while the Mann–Whitney U Test was used to compare differences between groups. Statistical significance was set at $p < 0.05$.

Ethical Considerations: Ethical approval was obtained from the Health Research Ethics Committee of STIKES Rumah Sakit Baptis Kediri (No. 029/14/IV/EC/KEPK-3/STIKES RSBK /2025). Written informed consent was obtained from all parents or guardians, and participant confidentiality was maintained throughout the study.

RESULTS AND DISCUSSION

An analysis of demographic and baseline characteristics was conducted to describe the study population and assess the similarity of participants in the intervention and control groups before the intervention.



Table 1. Respondent Characteristics

Characteristics	Group		Group		<i>p-value</i>
	Intervention Group (n=20)		Control Group (n=20)		
	F/M	%/SD	F/M	%/SD	
Mothers Age	31,8	6,028	31,1	5,379	0,777 ^a
Education					
Primery	2	10%	2	10%	0,663 ^a
Secondary	16	80%	13	65%	
Higher	2	10%	5	25%	
Mother's Job					
Housewife	15	75%	16	80%	0,609 ^a
Privat Sector	3	15%	0	0%	
Enterpreuner	2	10%	4	20%	
Baby's gender					
Female	9	45%	9	45%	1,000 ^a
Male	11	55%	11	55%	
Baby's Age	9,90	2.149	9,60	1,930	0,517 ^a
Baby's Weight (gram)	8.330	894,4	8.210	945,8	0,700 ^a
Bonding	3,30	0,801	4,00	0,918	0,801 ^b

Description : a. Homogeneity Test (Lavene Test), b. Shapiro Wilk Test

According to Table 1, there were no significant differences in respondent characteristics between the intervention and control groups, either in demographic variables or baseline indicators. This finding indicates that the two groups were comparable at baseline and suitable for evaluating the effects of the intervention.

The mean maternal age in both groups was approximately 31 years, representing mature reproductive age. Mothers within this age range are generally considered to have greater emotional and cognitive readiness to participate in infant care interventions,

including infant massage, which may facilitate mother–infant bonding and support improvements in infant appetite (Geary et al., 2023). Most mothers had a secondary level of education, which may contribute to a better understanding and implementation of appropriate massage techniques. Educational attainment has been associated with improved parenting practices and developmental stimulation in infants (Rafaela et al., 2023). In addition, the majority of mothers were housewives, allowing greater opportunities for consistent implementation of infant massage, thereby potentially enhancing



intervention effectiveness (Danielsson et al., 2024).

The infants were aged 6–12 months, a developmental period characterized by rapid growth and increasing nutritional demands. At this stage, infant massage may enhance gastric motility and digestive function, thereby promoting appetite, which was the primary outcome of this study (Zhang et al., 2023). Baseline body weight was comparable between groups, supporting the validity of subsequent comparisons. Although body weight was assessed as a supporting outcome, previous studies have shown that infant massage may contribute to weight gain through improved digestive activity and increased appetite (Lestari et al., 2021).

The majority of infants in both groups were male. Although sex was not the primary focus of this study, previous evidence suggests that biological sex may be associated with differences in growth patterns and body weight. Male infants tend to have slightly higher body weights than female infants of the same age due to hormonal influences, metabolic rate, and differences in muscle growth

tendencies (Page et al., 2023; Norris et al., 2019). Furthermore, a significant difference in weight gain between male and female infants has been reported, with male infants generally exhibiting a faster rate of growth during early life (Santana et al., 2025). Nevertheless, because the distribution of infant sex was comparable between groups, it was unlikely to have influenced the observed effects of the intervention on appetite.

Tabel 2. Appetite Before and After the Intervention in the Intervention Group

Variable	Intervention Group (n=20)		p-value
	Pretest Mean ± SD	Posttest Mean ± SD	
Apperite	94,6 ± 12,684	97,6 ± 10,190	0,004

Description: Wilcoxon Test

According to Table 2, revealed a p-value of 0. 004, indicating a statistically significant difference between the pretest - posttest scores (since $p < 0.05$). The study's results indicated that in the intervention group, there were notable outcomes, infant massage had a significant increasing appetite, with a p-value of 0.004. The intervention was administered twice a week for one month and was proven to provide a relaxing effect, stimulate the digestive system, and enhance the



release of comfort hormones that encourage infants to more readily accept food. This finding is consistent with previous studies indicating that stimulation through massage can activate the vagus nerve and enhance gastric motility. (Chen et al., 2021; Zhang et al., 2023). Moreover, infant massage has been found to reduce stress levels, which is frequently identified as a barrier to adequate appetite in infants. (Mrljak et al., 2022). Compared to previous studies conducted once a week on infants aged 12–24 months. (Fitriani et al., 2025), this study was conducted on infants aged 6–12 months with a frequency of twice per week.

These results were further supported by weight measurements. A significant difference in infant weight gain was observed between the intervention and control groups. The intervention group experienced an average weight increase of 580 grams, while the control group showed an average increase of only 240 grams. This finding is consistent with previous studies demonstrating that infants' weight tends to increase following regular infant massage. The increase was statistically significant ($p = 0.000$),

indicating that infant massage is effective in promoting weight gain (Hartati et al., 2020). Based on these results, infant massage holds significant potential in enhancing infant weight gain more effectively than in cases where no massage intervention is applied.

Tabel 3. Appetite Before and After in the Control Group

Variable	Control Group (n=20)		P-value
	Pretest Mean $\pm$ SD	Posttest Mean $\pm$ SD	
Appetite	90,15 $\pm$ 11,771	90,40 $\pm$ 11,274	0,336

Description: Wilcoxon Test

According to Table 3, the significance value was 0.336 ($p > 0.05$), indicating that there was no statistically significant difference between the pretest and posttest appetite scores in the control group. This finding suggests that, without specific stimulation such as infant massage, appetite levels tend to remain relatively stable. Similar findings have been reported in previous studies, which found no significant changes in appetite among infants receiving standard care alone (Ayu et al., 2024). Therefore, the significant improvement observed in the intervention group is likely attributable to the infant massage intervention.

It is important to note that infant appetite is influenced by multiple factors, including complementary feeding practices, breastfeeding status, illness, sleep patterns, teething, and maternal feeding behaviors. To minimize the influence of these potential confounding factors, participants in both groups were selected using the same inclusion criteria and were assessed within a similar age range. In addition, data collection was conducted over the same study period, and all infants received routine care according to local health recommendations. Consequently, the observed differences in appetite are more likely to be associated with the infant massage intervention rather than external factors affecting feeding behavior.

The present study differs from previous research in that infant massage was performed directly by mothers rather than by researchers. This approach may enhance the frequency and consistency of tactile stimulation while simultaneously strengthening mother–infant interaction. Gentle and structured tactile stimulation during infant massage has been shown to

stimulate oxytocin release, which plays an important role in promoting emotional bonding and reducing stress in both mothers and infants (Moussa et al., 2021). Reduced stress and improved emotional comfort may contribute to better feeding responses and increased appetite.

Tabel 4. Differences in Appetite Between the Two Groups

Variable	Intervention Group	Control Group	<i>p-value</i>
	(n=20)	(n=20)	
	Posttest	Posttest	
	Mean ± SD	Mean ± SD	
Appetite	97,6 ± 10,190	90,40 ± 11,274	0,027

Description: Mann-Whitney Test

According to Table 4, the mean appetite score of infants in the intervention group was higher (97.6 ± 10.190) than that of the control group (90.40 ± 11.274). The results of the Mann–Whitney test showed a *p*-value of 0.027 ($p < 0.05$), indicating that infant massage had a statistically significant effect on improving infants' appetite compared with standard care provided to the control group. This finding indicates that infant massage was more effective than standard care in improving infant appetite. Mothers in the intervention group also reported that their infants appeared more willing to

feed and demonstrated greater interest in eating following regular massage sessions. In contrast, no meaningful changes in feeding behavior were reported in the control group. These findings are consistent with previous research demonstrating a significant difference between intervention and control groups ($p = 0.002$), indicating that infant massage is more effective than standard care in enhancing infant appetite (Ayu et al., 2024). Although appetite was the primary outcome of this study, improved appetite may subsequently support adequate nutritional intake and healthy growth. Therefore, any changes in body weight should be interpreted as a secondary consequence of improved feeding behavior rather than the primary effect of the intervention.

CONCLUSIONS

Infant massage significantly improved appetite among infants aged 6–12 months in the intervention group, whereas no significant change was observed in the control group. These findings support the potential of infant massage as a safe, non-pharmacological

intervention for promoting appetite in infants.

Healthcare professionals should consider incorporating infant massage education into maternal and child health services. Future studies are recommended to employ larger sample sizes, longer intervention durations, and control for potential confounding variables, including feeding practices, breastfeeding status, and infant health conditions.

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