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Original Research

The Effect of Baby Massage on the Increase in Weight of Babies Aged 3–12 Months

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ABSTRACT

Background: Infant growth and development represent fundamental indicators of child health and well-being. Data from the 2022 Indonesian Nutrition Status Survey indicate a persistent prevalence of underweight among children, recorded at 17.0% in 2021 and slightly increasing to 17.1% in 2022. One approach commonly employed to support infant weight gain is baby massage. This study aimed to examine the effect of baby massage on weight gain in infants aged 3 to 12 months at the private midwifery practice (PMB) of Bd. Lialut Iftiyah, S.Keb, located in Malang District, Indonesia. **Methods:** This study employed a quasi-experimental design with a non-equivalent control group approach. A total of 36 infants aged 3 to 12 months were selected through random sampling and subsequently assigned to either the intervention group or the control group. Data were analyzed using a paired t-test. **Results:** The results revealed an average weight gain of 332 grams in the intervention group and 219 grams in the control group. A statistically significant difference was observed between the pretest and posttest measurements in both the intervention group ($p = 0.00$) and the control group ($p = 0.00$). **Conclusion:** These findings suggest that while both groups experienced weight gain, the increase was more substantial in the intervention group, indicating a greater effect of baby massage on infant weight gain.

Keywords: Infant massage; infant; weight gain

1. INTRODUCTION

Infancy represents a critical period in a child's growth and development, during which infants are particularly sensitive to environmental influences. Optimal growth and development during this stage require adequate nutrition and appropriate stimulation.[1] Several factors can disrupt the normal trajectory of a child's growth and development. If not addressed promptly, these health issues may lead to complications that hinder optimal development. One of the most commonly encountered concerns during infancy is inadequate weight gain. A variety of factors may influence an infant's weight, including nutritional intake, health status, and environmental conditions.[2]

According to the Indonesian Nutrition Status Survey (2022), the prevalence of underweight in children in Indonesia from 2021 to 2022 shows a condition that needs deeper attention. The prevalence of underweight infants in Indonesia was recorded at 17.0% in 2021, with a slight increase to 17.1% in 2022. Although this rise of 0.1% appears minimal, it nonetheless underscores that malnutrition among infants continues to be a significant public health challenge in the country. Meanwhile, according to Li (2016), in the western world parents and nurses are only taught massage to encourage the development of low-risk infants who do not have low birth weight. Over time, both infants

with weight problems or not have been encouraged to receive this intervention.

Factors that cause malnutrition include inadequate nutrition, lack of parental knowledge about breastfeeding, and an unclean environment.[5] Some efforts that can be made to help infants achieve optimal weight include providing adequate nutrition and performing regular infant massage. It combines touch, gaze, attention, movement, and affection. Utilizing various techniques, massage involves rubbing and gently, slowly stroking different parts of the body sequentially. Massage can be performed with or without oils, such as mineral oil, olive oil, and other plant-based oils.[6]

Additional benefits of infant massage include supporting exclusive breastfeeding, stimulating the infant's appetite, promoting better sleep quality, facilitating weight gain, enhancing immune system function, and strengthening the bond between parents and their children.[7] Infants who are massaged increase activity in the vagus nerve so that absorption in digestion becomes faster and the baby feels hungry quickly. Infant massage can also increase the amount of absorption enzymes, namely gastrin and insulin, in the body. This makes food absorbed faster and body weight increases.[8]

This theory aligns with a study conducted by Harahap (2019). The results indicated that infant massage can promote weight gain in infants aged 0-6 months.[2] The study employed a paired sample T-test with a True Experimental design, incorporating a randomized control group pretest-posttest design approach. Massage was done twice a week for 10-15 minutes over one month. The study findings showed that the weight of the control group infants during one month increased by 470 grams and the intervention group increased by 1250 grams. With a p-value of 0.000 ($\alpha = 0.05$), the conclusion supports the acceptance of H_a.

This study is crucial to understand the benefits and impact of infant massage on infant growth and development, particularly on body weight. Infancy is a critical phase for growth and development, necessitating additional interventions beyond infant nutrition to optimize outcomes. Weight issues are prevalent and can lead to malnutrition in infants. Stunting remains a significant issue among infants today.

The research conducted exhibits fundamental differences with previous studies, particularly in the indicators or parameters utilized. Conversely, previous studies solely focused on weight gain without taking into account the established minimum standards. The objectives of this research include optimizing the growth and development of infants during their crucial period, educating parents on independent baby massage techniques at home and raising awareness within the community about the benefits of baby massage for growth and development.

2. METHODS

2.1 Research Design

The study utilized a Quasi-experimental design Non-Equivalent Control Group, incorporating both control and intervention groups. Observations were conducted both before and after implementing the baby massage intervention.

2.2 Place and Time of Research

The study was conducted at PMB Bdn. Lialut Iftiyah, S. Keb Malang Regency during the period of January-February 2025, including the preparation process, respondent data collection, intervention, and data analysis.

2.3 Population and Sample

A total of 32 infants aged 3-12 months were divided into intervention and control groups through simple random sampling techniques. The inclusion criteria for this research sample comprise healthy 3-12 month-old babies, underweight 3-12 month-old babies, and cooperative mothers and babies. The exclusion criteria include infants aged 3-12 months with contraindications for baby massage.

2.4 Research Implementation

The researcher obtained the necessary research permit from the Head of the Undergraduate Midwifery Study Program at ITSK Dr. Soepraoen Hospital. Subsequently, a formal application for research approval was submitted to the relevant health facility. The researcher then prepared pretest and posttest instruments to measure infant weight. This study uses primary data obtained through direct measurement of infant weight before (pretest) and after (posttest) the infant massage intervention. The intervention was conducted twice a week with a massage duration of 10-15 minutes. Furthermore, the researchers identified the increase in body weight before and after the provision of infant massage therapy.

2.5 Research Instruments

The instrument used was an observation sheet containing a table recording the baby's weight, while the instruments for implementing massage interventions included baby weight scales, massage oil (baby oil) and baby mats.

2.6 Data Analysis

Data analysis began with univariate procedures to describe the frequency distribution of general variables and specific data, including infant weight. The mean infant weight before and after the intervention was also calculated. Normality of the data was assessed using the Shapiro-Wilk test. Subsequently, bivariate analysis was conducted employing the paired t-test to evaluate the difference in mean infant weight between the pretest and posttest measurements.

2.7 Research Ethics

This study received ethical approval from the Ethics Committee of the Institute of Technology, Science, and Health at Dr. Soepraoen Hospital, reference number KEPK-EC/215/II/2025. The study's objectives and procedures were thoroughly explained to all participants prior to data collection, and informed consent was obtained from each respondent. Confidentiality and privacy of patient data will be upheld in accordance with health research ethics guidelines. The collected information will be processed anonymously and solely used for research.

3. RESULTS

Referring to Table 1, among the 16 infants receiving massage intervention, 10 were female, constituting 62.5% of the group. Meanwhile, in the control group, 9 out of 16 newborns, or 56.3%, were female as well. The table further illustrates the intervention group had the highest percentage of 11-month-old infants—18.8%, equivalent to three babies. Conversely, the control group displayed a more balanced age distribution, with 12.5% of infants aged 3, 5, 7, 8, 9, and 12 months respectively.

Regarding maternal employment status, the majority of participants in both groups were homemakers, with 13 individuals (81.3%) in the intervention group and 14 individuals (87.5%) in the control group. In terms of educational background, most mothers in both groups were high school graduates, totaling 12 participants (75%) in each group. While in terms of income level, the majority were in the income 1,500,000 – 2,500,000 / month and > 2,500,000 / month, with each totaling seven people in the intervention group (43.8%), while in the control, the majority were in the income > 2,500,000 / month a total of 8 people (50%).

Table 1. Frequency distribution of respondent's characteristics

Criteria	Intervention		Control	
	F	%	F	%
Infant age				
3 months	2	12.5	2	12.5
4 months	1	6.3	1	6.3
5 months	1	6.3	2	12.5
6 months	2	12.5	1	6.3
7 months	2	12.5	2	12.5
8 months	2	12.5	2	12.5
9 months	2	12.5	2	12.5
10 months	-	-	1	6.3
11 months	3	18.8	1	6.3
12 months	1	6.3	2	12.5
Gender				
Male	6	37.5	7	43.8
Female	10	62.5	9	56.3
Mother's employment status				
Housewife	13	81.3	14	87.5
Work	3	18.8	2	12.5
Mother's education				
Elementary school	-	-	-	-
Junior high school	3	18.8	3	18.8
Senior high school	12	75.0	12	75.0
University	1	6.3	1	6.3
Parents income level (per month)				
< 1.500.000	2	12.5	2	12.5
1,500,000 – 2,500,000	7	43.8	6	37.5
> 2,500,000	7	43.8	8	50.0

Based on Table 2, it can be concluded that the average pre-test body weight of the intervention group infants is 6,106 grams. While the average post-test body weight in infants is 6,438 grams. The difference in baby weight before and after the intervention is 332 grams. This means that the p-value is 0.00, showing the impact of giving baby massage on body weight before and after the intervention. Table 2 shows that the average pre-test body weight of the control group is 5,744 grams. In contrast, the post-test p-value is 5,963 grams, so the

difference between the initial and final baby weight is 219 grams. For the control group, the p-test obtained is 0.00, indicating the effect of baby massage stimulation on the pre-test and post-test baby weight of the control group.

Based on the results of the bivariate test in each group, it can be concluded that there is a significant difference in the increase between the two groups, indicating an impact of baby massage application on the weight of babies aged 3-12 months.

Table 2. Bivariate analysis of infant weight in intervention and control groups

Group		N	Mean	Minimum	Maximum	SD	*p*-value
Intervention	Pretest	16	6.106	4.0	6.8	0.89	0.00
	Posttest		6.438	4.3	7.2	0.81	
Control	Pretest	16	5.744	4.3	7.0	0.84	0.00
	Posttest		5.963	4.9	7.4	0.78	

4. DISCUSSION

Based on the analyzed data, both the intervention and control groups demonstrated an increase in body weight. Although a difference in the mean values between the pretest and posttest was observed in both groups, the increase in the intervention group was notably greater than that in the control group. Massage is a traditional healing method first recorded in Chinese medical literature more than 4000 years ago.[9] Meeting the basic needs of newborns and toddlers has a major impact on their growth and development. “Triple A” refers to these basic needs, which include the essential requirements for early cognitive stimulation, emotional connection, and nourishment.[10]

Infant massage is one type of stimulation that can improve the function of body structures and organs. Massage can make babies cheerful, happy, and less restless.[11] Infant massage is an effort to provide stimulation for the development of the structure and function of cells in the brain. With massage, blood flow improves. Gentle physical touch through infant massage serves as a meaningful form of interaction that strengthens the bond between parent and child. Evidence suggests that infants who receive massage for approximately 15 minutes tend to exhibit improved calmness, enhanced sleep quality, and better overall growth and developmental outcomes.[12] "Sensory stimulation massage has been proven to provide stimulation to growth and encourage increased child development. In addition, massage can support fussy babies in sleeping well and reduce illnesses, including colic. However, knowledge and awareness of infant massage remain limited within the community. Many parents continue to rely on traditional healers for this practice, and there is a lack of adequate understanding and training among healthcare professionals regarding the proper implementation of infant massage.[8]

Infant massage can enhance the baby's muscle strength, boost immunity, aid in weight gain, alleviate pain, and promote better quality sleep. For babies with weight issues, consistent massage can be beneficial by stimulating nerves, skin, and hormone production that affect weight gain.[13] According to Lu et al. (2020), The increase in infant weight occurs due to increased vagal activity, which is associated with weight gain and maturation of sleep-wake behavior. In addition, the increase in gastric movements and growth factors such as insulin-1 (IGF-1) is also a factor in better digestion of infants and increased body weight.

In addition, infant massage has been shown to support the growth and development of high-risk postnatal infants, including those born prematurely or exposed to HIV. It can enhance physical development and improve digestive function, particularly in premature infants. Furthermore, infant massage can enhance the development of milk production, conversation and recognizing infant cues.[15] Massage therapy for infants may have the ability to reduce pain, reduce jaundice, and promote weight gain.[16] According to Field, there is a strong correlation between massage stimulation and infant weight gain. Infants who received massage therapy were found to gain approximately 47% more weight per day compared to those who did not receive such stimulation. This effect is believed to be associated with increased activity of the vagus nerve and enhanced gastric motility, both of which contribute to improved digestion and more efficient nutrient absorption, ultimately supporting greater weight gain.[17] Improper infant massage can also have adverse effects, including swelling, muscle and bone injury, trauma or

bruising to the skin and muscles, and pain that makes the baby unhappy. Infant massage is safe and beneficial when performed correctly and gently.[18] The mother can continue the massage intervention if the baby is satisfied and enjoys the touch. If the baby displays signs of sleepiness, for example, by yawning, or if the premature baby shows symptoms of distress, grimacing, choking, hiccups, crying, or arching the back, mothers stop and try massage at a later time.[19]

Riset Carolin et al. (2020) demonstrated a significant disparity in weight gain rates between the two groups.[20] On average, subjects in the intervention cohort increased their weight by 793 grams, whereas those in the control cohort gained 400 grams. Both groups exhibited statistically meaningful differences between pre- and post-test measurements ($p = 0.000$ for each). Additionally, bivariate analysis revealed a significant outcome ($p = 0.000$) when comparing the groups. These findings indicate weight gain occurred in both groups, yet the intervention group's increase was nearly double that of the control group, confirming the efficacy of infant massage.

Supporting this notion, research by Harahap (2019) revealed that massaging infants aged 0 to 6 months facilitated weight acquisition. The study employed a paired sample t-test within a true experimental design featuring a randomized control group pretest-posttest framework. The massage intervention was applied twice weekly for 10 to 15 minutes per session over one month. By the end of this period, infants in the intervention group had gained 1,250 grams, in contrast to 470 grams in the control group. The alternative hypothesis (Ha) was accepted based on a p-value of 0.000 ($\alpha = 0.05$).

Based on the researcher's observations, stimulation through baby massage appears to have a significant impact on optimizing infant weight during the growth and development period. While adequate nutrition remains essential, the provision of additional stimulation plays a complementary role in promoting overall development. Infant massage, in particular, contributes positively to motor development and supports the function of organ systems at the cellular level. However, there are some shortcomings of the study, namely that at times the researcher experienced difficulties in implementation that were not conducive to massaging the baby. First, the sample size was small, so the results cannot be generalized widely. Secondly, this study did not account for the potential influence of confounding variables that may have affected the outcomes, such as the infant's health status, nutritional intake, and other external factors. Therefore, further research is needed to explore these variables and better understand their impact on the effectiveness of infant massage.

5. CONCLUSION

Infant massage has been shown to play a significant role in supporting infant growth and development. Infants who received this form of stimulation demonstrated greater weight gain compared to those who did not undergo the intervention. This effect is likely attributed to improved nutrient absorption facilitated by massage, which enhances gastrointestinal function and promotes more efficient utilization of nutritional intake, thereby contributing to increased body weight. Future researchers can further analyze the influence of confounding variables from infant massage that can affect the results of research, such as the baby's health condition, baby nutrition, and so on, which affect the final result of baby weight in addition to the stimulation factor of infant massage. For health workers can provide education about baby massage to the wider community and teach mothers to massage their babies, which can be carried out independently at home.

Ethical Approval

This study has been declared ethically sound by the ITSK RS dr. Soepraoen Health Research Ethics Committee in Malang, with reference number KEPK-EC/215/II/2025.

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Competing Interests

All the authors declare that there are no conflicts of interest.

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No funds were received for this study.

Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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