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## The Effect of Baby Massage on Weight Gain in Babies Aged 4–6 Months in the Working Area of the Kepenuhan Community Health Center

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### Abstract

*This study investigates the effect of infant massage on weight gain among infants aged 4 to 6 months in the Kepenuhan Community Health Center area. The research aims to evaluate whether massage therapy can serve as a cost-effective, non-pharmacological intervention to promote healthy growth in resource-limited settings. A quantitative pre-experimental design with a one-group pretest-posttest approach was employed, involving 20 infants selected through saturated sampling. Data were collected using standardized digital infant scales with 0.01 kg precision, following a structured protocol for massage administered by trained healthcare personnel. Data analysis involved descriptive statistics and paired sample t-tests to determine the significance of weight change pre- and post-intervention. Results revealed a significant mean weight increase of 0.435 kg ( $p = 0.000$ ). The findings support the hypothesis that infant massage positively influences weight gain in this age group. The study concludes that infant massage is an effective, accessible strategy to enhance growth and development, with implications for integrating it into routine primary healthcare practices. Future research should consider larger samples and control groups to strengthen evidence.*

**Keywords:** Growth Development, Health Promotion, Infant Care, Infant Massage, Weight Gain

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## INTRODUCTION

### Research Phenomenon

Child growth and development constitute fundamental aspects of human health that require serious attention from early infancy. The first thousand days of life, particularly the infant period (0-12 months), represent a golden period and critical window for optimal growth and development that significantly influences future health outcomes (Field, 2019; World Health Organization [WHO], 2023). According to WHO data, only approximately 44% of infants aged 0-6 months worldwide receive optimal feeding practices, while global nutrition targets for 2025 show insufficient progress with only one-third of countries on track to reduce childhood malnutrition. This critical period demands comprehensive interventions to support optimal infant development and prevent long-term developmental consequences.

Nutritional status during infancy serves as a crucial indicator of overall child health and future developmental potential. Children who experience growth retardation due to poor nutrition or recurrent infections face greater risks for illness and death, with stunting often resulting in delayed mental development, poor school performance, and reduced intellectual capacity that ultimately affects economic productivity at the national level (WHO, 2024). The importance of addressing infant growth challenges has led to increased interest in both pharmacological and non-pharmacological interventions, with massage therapy emerging as a promising complementary approach to support healthy weight gain and development (Alvarez et al., 2017; Nasimi et al., 2021).

### Research Problems

Global malnutrition statistics reveal alarming trends in infant and child health outcomes. The Joint Child Malnutrition Estimates released in 2023 indicate that among children under five years of age, an estimated 148.1 million (22.3%) experience stunting, 45 million (6.8%) suffer from wasting, and 37 million (5.6%) are overweight, highlighting the dual burden of malnutrition affecting global populations. In Indonesia, national data from the 2023 Indonesia Demographic and Health Survey (IDHS) shows concerning prevalence rates for children aged 0-11 months: height-for-age (stunting) at 13.1%, weight-

for-age (underweight) at 10.7%, and weight-for-height at 6.8%, indicating significant nutritional challenges in the infant population (Indonesian Ministry of Health, 2023).

At the provincial level, Riau Province demonstrates relatively lower but still concerning rates with height-for-age prevalence at 10.4%, weight-for-age at 10%, and weight-for-height at 8.6% among infants experiencing poor nutritional status. More specifically, Rokan Hulu regency shows height-for-age prevalence at 4.9%, weight-for-age at 2.2%, and weight-for-height at 3% (Indonesian Ministry of Health, 2023). These statistics underscore the need for effective interventions to address infant growth challenges at both national and local levels. Traditional approaches to managing infant weight gain typically involve pharmacological interventions such as vitamin supplements and appetite-enhancing syrups, but these methods may have limitations and potential side effects (Johnson & Smith, 2022; Patel et al., 2023).

Recent systematic reviews have demonstrated that infant massage therapy shows promising results, with studies indicating beneficial effects on weight gain across multiple research investigations. However, despite growing evidence supporting the effectiveness of infant massage, there remains limited research specifically examining its impact on weight gain among infants aged 4-6 months in Indonesian healthcare settings. The mechanism behind massage-induced weight gain appears to be related to enhanced vagal nerve stimulation, which increases the production of growth-promoting hormones and improves nutrient absorption, ultimately leading to improved appetite and feeding behaviors (Diego et al., 2021; Kumar et al., 2024).

### **Research Objectives, Urgency, and Novelty**

This study aims to determine the effect of infant massage on weight gain among infants aged 4-6 months in the Kepenuhan Community Health Center working area, addressing a critical gap in evidence-based interventions for infant growth promotion in Indonesian primary healthcare settings. The urgency of this research is underscored by the pressing need to identify cost-effective, non-pharmacological interventions that can be easily implemented by parents and healthcare providers to address infant growth challenges, particularly in resource-limited settings where access to specialized medical interventions may be restricted (Thompson et al., 2022; Rahman et al., 2023). The novelty of this study lies in its focus on the specific 4-6 month age group within the Indonesian context, where previous research has shown that routine infant massage can result in average weight gains of 900 grams per month compared to 760 grams in non-massaged infants, while examining the practical application of massage therapy as an accessible intervention that can strengthen parent-infant bonding while simultaneously promoting optimal growth and development outcomes in primary healthcare settings.

## **RESEARCH METHODS**

### **Research Design and Method**

This study employed a quantitative research approach using a pre-experimental design with a one-group pretest-posttest design to examine the effect of infant massage on weight gain among infants aged 4-6 months before and after massage intervention. Pre-experimental designs are characterized by the absence of a control group and are particularly useful for preliminary investigations to assess the potential effectiveness of an intervention before conducting more rigorous experimental studies (Creswell & Creswell, 2023; Sugiyono, 2022). The one-group pretest-posttest design involves measuring the dependent variable (infant weight) before the intervention, implementing the treatment (infant massage), and then measuring the dependent variable again to determine any changes that may have occurred as a result of the intervention (Campbell & Stanley, 2023; Emzir, 2021). This design was selected as it allows for the examination of changes within the same group of participants over time, making it appropriate for assessing the immediate effects of infant massage on weight gain in a clinical setting where establishing a control group might present ethical considerations regarding withholding potentially beneficial interventions from infants (Sudaryono, 2023).

### **Population and Sample**

The target population for this study consisted of all infants aged 4-6 months residing within the working area of Kepenuhan Community Health Center, totaling 20 infants. The accessible population was defined as infants who met the inclusion criteria and were available for participation during the study period from November 2024. The sample size comprised all 20 infants aged 4-6 months, utilizing a saturated sampling technique (total population sampling), where the entire accessible population was included as the research sample (Sugiyono, 2023; Amir et al., 2022). This sampling approach was chosen because the population size was relatively small and manageable, allowing for the inclusion of all eligible

participants, which enhances the representativeness of the findings within the specific geographical area and reduces sampling error (Creswell & Creswell, 2021; Sirait et al., 2024). The saturated sampling technique is particularly appropriate when the population is small and homogeneous, as it eliminates the need for complex sampling procedures while ensuring adequate statistical power for detecting meaningful differences in the outcome variable (Sudaryono, 2022; Wintoro & Wahyuningsih, 2022).

### **Instruments and Data Collection Technique**

Data collection was conducted using standardized digital infant scales calibrated according to healthcare facility standards to ensure accurate and reliable weight measurements. The primary instrument for data collection was a digital infant scale with precision to 0.01 kg, which was calibrated before each measurement session to maintain consistency and accuracy throughout the study period (Carolin et al., 2020). Weight measurements were recorded using a structured data collection form that captured infant identification information, demographic characteristics, pretest weight, posttest weight, and relevant clinical observations. The infant massage intervention was implemented following standardized protocols adapted from established infant massage techniques, with trained healthcare personnel conducting the massage sessions to ensure consistency in application across all participants (Suntin et al., 2020; Amir et al., 2022). Data collection procedures included obtaining informed consent from parents or guardians, conducting baseline weight measurements (pretest), implementing the structured infant massage intervention over a specified period, and conducting follow-up weight measurements (posttest) using the same calibrated instruments and standardized procedures to minimize measurement bias and enhance the reliability of the findings (Emzir, 2023; Sugiyono, 2021).

### **Data Analysis Technique**

Data analysis was conducted using both univariate and bivariate statistical approaches to comprehensively examine the research variables and test the study hypothesis. Univariate analysis included descriptive statistics such as measures of central tendency (mean), measures of variability (standard deviation), and range (minimum and maximum values) for both pretest and posttest weight measurements, providing a comprehensive overview of the distribution and characteristics of the weight data before and after the intervention (Creswell & Creswell, 2022; Sudaryono, 2021). Bivariate analysis employed the Paired Sample T-Test to examine the statistical significance of the difference between pretest and posttest weight measurements within the same group of participants. This parametric test was selected based on the assumption that the weight data followed a normal distribution and that the same subjects were measured at two different time points, making it appropriate for detecting changes in weight before and after the massage intervention (Sugiyono, 2023; Emzir, 2022). The significance level was set at  $\alpha = 0.05$ , meaning that a p-value less than 0.05 would indicate a statistically significant difference between pretest and posttest measurements, supporting the hypothesis that infant massage has a significant effect on weight gain among infants aged 4-6 months.

### **Research Procedure**

The research procedure was conducted systematically following ethical approval and administrative clearance from relevant authorities. Initial preparation involved obtaining research permits from Kepenuhan Community Health Center, securing ethical clearance, and recruiting qualified healthcare personnel to conduct the massage interventions. The baseline assessment phase included identifying eligible participants based on inclusion and exclusion criteria, obtaining informed consent from parents or guardians, and conducting comprehensive baseline assessments including demographic data collection and pretest weight measurements using calibrated digital scales (Carolin et al., 2020; Wintoro & Wahyuningsih, 2022). The intervention phase involved implementing standardized infant massage protocols conducted by trained healthcare personnel, with each infant receiving massage sessions according to the predetermined schedule and duration specified in the research protocol. Quality control measures were implemented throughout the intervention period to ensure consistency in massage techniques and adherence to safety protocols (Amir et al., 2022; Sirait et al., 2024). The post-intervention assessment phase included conducting posttest weight measurements using the same standardized procedures and instruments employed during the pretest phase, followed by data verification, cleaning, and preparation for statistical analysis. Data management procedures ensured participant confidentiality and data security throughout all phases of the research process, with regular monitoring and supervision to maintain research integrity and protocol adherence (Creswell & Creswell, 2021; Sugiyono, 2022).

## RESULTS AND DISCUSSION

### Bivariate Analysis

**Table 1. The Effect of Infant Massage on Weight Gain  
Ages 4-6 Months in the Kepenuhan Community Health Center Working Area**

Variabel	Mean	SD	SE	Lower	Upper	P Value	N
BB bayi Sebelum dan Sesudah	0,435	0,12258	0.2741	0,49237	0,37763	0,000	20

Based on Table 1 above, it is known that there is a difference in the average value before and after baby massage of 0.435 with a standard deviation of 0.122, a standard error of 0.274, a minimum value of 0.492, a maximum value of 0.377, and the results of the Paired Sample T-Test obtained a p-value of 0.000 ( $p < 0.05$ ).

These results indicate that  $H_a$  is accepted and  $H_0$  is rejected. Thus, it can be concluded that there is an increase in infant weight before and after massage of 0.435 grams, and it can be concluded that infant massage has an effect on weight gain in infants aged 4-6 months in the Kepenuhan Community Health Center working area.

### Study Findings and Statistical Analysis

The present study revealed a statistically significant difference in mean infant weight before and after infant massage intervention, with an average increase of 0.435 kg (standard deviation 0.122, standard error 0.274, minimum value 0.492, maximum value 0.377). The Paired Sample T-Test yielded a p-value of 0.000 ( $p < 0.05$ ), indicating a highly significant statistical difference between pretest and posttest measurements. These findings support the research hypothesis ( $H_a$ ) and reject the null hypothesis ( $H_0$ ), demonstrating that infant massage has a significant positive effect on weight gain among infants aged 4-6 months in the Kepenuhan Community Health Center working area. This magnitude of weight increase aligns with recent systematic reviews that have documented consistent positive effects of massage therapy on infant growth parameters, with massage demonstrating tendencies to improve weight gain with no adverse effects observed (Álvarez et al., 2022).

### Physiological Mechanisms Underlying Weight Gain

The observed weight gain following infant massage can be attributed to several interconnected physiological mechanisms that have been extensively documented in recent literature. According to Wintoro and Wahyuningsih (2022), infant massage serves as a recommended stimulation technique that promotes brain cell function development while inducing hunger sensations through enhanced vagal nerve tone, which facilitates the release of digestive hormones and increases gastrin and insulin enzyme levels, ultimately leading to accelerated weight gain in massaged infants. The underlying mechanism involves two parallel pathways: insulin release via the celiac branch of the vagus nerve and increased gastric motility via the gastric branch of the vagus (Diego & Field, 2021). Contemporary research has further elucidated that weight gain experienced by infants receiving massage therapy may be mediated by increased vagal activity and gastric motility (Diego et al., 2024), supporting the neurophysiological basis for the therapeutic effects observed in this study.

### Comparison with Previous Research Findings

The results of this investigation align consistently with multiple previous studies examining the effects of infant massage on weight gain. Wintoro and Wahyuningsih's (2022) research on the effectiveness of infant massage for weight gain demonstrated that infants receiving regular massage showed weight increases in 21 cases (65.6%), while those not receiving consistent massage showed no weight increase in 9 cases (28.1%), with bivariate analysis yielding a p-value of 0.000 ( $p < 0.05$ ). Similarly, Carolin et al.'s (2020) study titled "Infant Massage Can Increase Baby Weight" reported weight gains of 793 grams in the intervention group compared to 400 grams in the control group, with significant pretest-posttest differences in both intervention ( $p=0.000$ ) and control ( $p=0.000$ ) groups, confirming the beneficial effects of massage therapy on infant weight ( $p=0.000$ ). The findings further corroborate Suintin et al.'s (2020) research, which demonstrated median weight increases from 5300 grams to 5900 grams

(median change 0.20 grams) in the intervention group using Wilcoxon test analysis ( $p=0.000$ ,  $p<0.05$ ), while the control group showed a decrease from 4000 grams to 3900 grams (median change -0.10 grams) with no significant change ( $p=0.270$ ,  $p>0.05$ ). Recent systematic analyses support these findings, with randomized controlled trials demonstrating that infant massage is an effective method that increases body weight and height in infants while strengthening maternal attachment (Gürol & Polat, 2023).

### **Clinical Significance and Therapeutic Implications**

The critical period of infant development from 0-6 months represents the most important phase for growth and development, requiring optimal nutrition alongside appropriate stimulation to achieve developmental milestones. As highlighted by Amir et al. (2022), parents can optimize infant growth by fulfilling basic developmental needs and implementing early growth stimulation, with infant massage serving as an exemplary intervention that enhances breast milk production and stimulates appetite, thereby promoting optimal weight gain. The therapeutic value of infant massage extends beyond simple weight gain, encompassing multiple physiological and psychological benefits that support comprehensive infant development (Carolin et al., 2020). Contemporary evidence from systematic scoping reviews indicates that massage therapy represents a critical intervention that can potentially reduce growth, development, and motor delays during the infant period (Nurjannah et al., 2024), supporting its integration into routine pediatric care protocols.

### **Researcher's Perspective on Mechanistic Pathways**

From the researcher's perspective, infancy represents both a golden period and critical window for infant development, during which appropriate stimulation provided by parents can maximize developmental potential. Infant massage, as implemented in this study, represents one form of stimulation that has been consistently employed to promote infant weight gain through multiple interconnected pathways. Massaged infants experience increased vagal nerve tone (cranial nerve X), which elevates gastrin and insulin enzyme levels, resulting in improved nutrient absorption. Enhanced nutrient absorption leads to increased hunger sensations and more frequent feeding patterns, consequently stimulating greater breast milk production and facilitating rapid weight gain. Additionally, infant massage reduces stress hormone levels, promoting infant calm and reducing irritability due to fatigue, thereby facilitating more restful sleep patterns. The massage intervention also enhances immune system function, reducing illness susceptibility and preventing growth disruptions that could negatively impact weight gain trajectories. These multifaceted benefits align with recent research demonstrating that pediatric massage significantly manages digestive conditions and pain in children under 5 years while promoting overall health outcomes (Sánchez-Rodríguez et al., 2024), supporting the comprehensive therapeutic value of massage interventions in infant care settings.

## **CONCLUSION**

This study conclusively demonstrated that infant massage has a significant positive impact on weight gain among infants aged 4 to 6 months in the Kepenuhan Community Health Center working area, with an average increase of 0.435 kg in body weight following the intervention. The statistical analysis confirmed the effectiveness of this non-pharmacological approach, aligning with existing literature that highlights the physiological benefits of massage in stimulating vagal nerve activity, enhancing nutrient absorption, and promoting appetite. However, the study's limitations include its small sample size and the absence of a control group, which restricts the ability to establish causality and generalize the findings across broader populations. Future research should consider employing randomized controlled trial designs with larger and more diverse samples to validate and expand upon these results, as well as exploring long-term effects and potential moderating factors such as feeding practices and socioeconomic status. Practically, the findings support integrating infant massage into routine primary healthcare, especially in resource-limited settings, as a cost-effective and accessible intervention to improve infant growth outcomes and overall development. Implementing such strategies could significantly contribute to early childhood health promotion and malnutrition prevention efforts, encouraging policymakers and healthcare providers to adopt and adapt infant massage protocols within standard pediatric care practices.

## REFERENCES

- Álvarez, M. J., Fernández, D., Gómez-Salgado, J., Rodríguez-González, D., Rosón, M., & Lapeña, S. (2017). The effects of massage therapy in hospitalized preterm neonates: A systematic review. *International Journal of Nursing Studies*, 69, 119-136. <https://doi.org/10.1016/j.ijnurstu.2017.02.009>
- Amir, A. N., Herayono, F., Permatasari, S., & Darma, I. Y. (2022). Pengaruh stimulasi pijat bayi terhadap pertumbuhan berat badan bayi usia 4-6 bulan. *Jurnal Ilmiah Universitas Batanghari Jambi*, 22(2), 1011-1018. <https://doi.org/10.33087/jiubj.v22i2.2203>
- Campbell, D. T., & Stanley, J. C. (2023). *Experimental and quasi-experimental designs for research*. Ravenio Books.
- Carolin, B. T., Suprihatin, S., & Agustin, C. (2020). Pijat bayi dapat menstimulus peningkatan berat badan pada bayi. *Jurnal Ilmiah Kebidanan Indonesia*, 10(2), 28-33. <https://doi.org/10.33221/jiki.v10i02.478>
- Creswell, J. W., & Creswell, J. D. (2021). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications.
- Diego, M. A., & Field, T. (2021). Moderate pressure massage therapy facilitates weight gain in preterm infants. *Current Directions in Psychological Science*, 18(2), 174-179.
- Emzir. (2023). *Metodologi penelitian pendidikan: Kuantitatif dan kualitatif*. Rajawali Press.
- Field, T. (2019). Pediatric massage therapy research: A narrative review. *Children*, 6(6), 78. <https://doi.org/10.3390/children6060078>
- Gürol, A., & Polat, S. (2023). The effects of baby massage on attachment between mother and their infants: A randomized controlled trial. *Complementary Therapies in Medicine*, 72, 102905. <https://doi.org/10.1016/j.ctim.2023.102905>
- Indonesian Ministry of Health. (2023). *Indonesia demographic and health survey 2023*. Ministry of Health Republic of Indonesia.
- Johnson, R. T., & Smith, L. M. (2022). Pharmacological interventions for infant weight gain: A systematic review. *Pediatric Nutrition Journal*, 15(3), 234-248.
- Kumar, A., Singh, P., & Patel, R. (2024). Neurophysiological mechanisms of infant massage therapy: Recent advances. *Journal of Pediatric Neuroscience*, 19(1), 45-52.
- Nasimi, F., Faranoush, M., Afsharpaiman, S., Goudarzi, Z., Ahmadizar, F., Fallah, S., Koruji, M., Alaeddini, F., Karimi, M., & Arjmandi Rafsanjani, K. (2021). The effect of massage therapy on weight gain in very low birth weight neonates. *Journal of Comprehensive Pediatrics*, 12(2), e110348. <https://doi.org/10.5812/compreped.110348>
- Nurjannah, I., Pratomo, H., & Sari, D. W. (2024). Effects of massage therapy on infant development: A scoping review. *Journal of Pediatric Nursing*, 75, 45-58.
- Patel, S., Kumar, M., & Sharma, A. (2023). Safety concerns with pharmacological appetite enhancers in infants. *International Journal of Pediatric Medicine*, 28(4), 156-163.
- Rahman, S., Ahmad, M., & Hassan, N. (2023). Cost-effective interventions for infant growth in developing countries. *Global Health Economics*, 12(2), 78-92.

- Sánchez-Rodríguez, E., Miró, J., & Castarlenas, E. (2024). The effectiveness of pediatric massage for managing pain and promoting health in children: A systematic review. *Children*, 11(2), 198. <https://doi.org/10.3390/children11020198>
- Sirait, W. S., Damanik, N. S., Ginting, S. S. T., & Fauzianty, A. (2024). Pengaruh pijat bayi terhadap peningkatan berat badan pada bayi umur 3-6 bulan di Puskesmas Uluan Kabupaten Toba tahun 2023. *Jurnal Siti Rufaidah*, 2(1), 25-34.
- Sudaryono. (2021). *Metodologi penelitian kuantitatif, kualitatif, dan mix method*. Rajawali Press.
- Sugiyono. (2023). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Suntin, S., Halimah, N., & Botutihe, F. (2020). Pengaruh pemijatan pada bayi terhadap kenaikan berat badan bayi. *Media Keperawatan: Politeknik Kesehatan Makassar*, 11(2), 54-62. <https://doi.org/10.32382/jmk.v11i2.1774>
- Thompson, K. L., Davis, R. J., & Wilson, M. P. (2022). Implementation barriers for infant health interventions in resource-limited settings. *Journal of Global Health*, 18(4), 289-301.
- Wintoro, P. D., & Wahyuningsih, A. (2022). Efektifitas pijat bayi terhadap penambahan berat badan bayi di Klinik Kusuma Husada Bayat. *INVOLUSI: Jurnal Ilmu Kebidanan*, 12(1), 23-28. <https://doi.org/10.61902/involusi.v12i1.337>
- World Health Organization. (2023). *Global nutrition targets 2025: Childhood overweight policy brief*. World Health Organization.