



Mitigation of Stunting via the Implementation of Infant Massage in Indonesia: A Scoping Review

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ABSTRACT

Introduction: Stunting is a health concern resulting from chronic malnutrition during gestation and early childhood, resulting in inadequate growth and compromised development. An effective strategy to mitigate stunting is baby massage, which can promote growth, boost digestion, and improve the infant's overall health.

Objective: This study is to evaluate and summarize the current scientific evidence on the efficacy of baby massage in mitigating stunting and to establish a foundation for endorsing baby massage interventions within stunting prevention initiatives in developing countries.

Method: The Scoping review used the H. Arksey & L. O'Malley framework with the article selection process guided by the PRISMA protocol. The search for journal articles used the Proquest, PubMed, Google Scholar, Scopus, and Garuda.

Result: Infant massage can significantly enhance body length growth, weight gain, and developmental markers such as personal social skills, gross motor skills, fine motor skills, and language, which are crucial in preventing stunting.

Conclusion: This review identified significant advantages of infant massage for the growth and enhancement of newborns, including efforts to prevent hindrances. Consistent infant massage can augment weight and height, bolster the immune system, enhance motor development, fortify parent-child attachment, stimulate appetite and food consumption, and elevate infant sleep quality.

Keywords: *Growth and Development, Infant massage, Stunting*

INTRODUCTION

Every newborn possesses the potential to be unique owing to numerous hereditary and natural components. The developmental achievements of children beneath five a long time ancient in creating nations shift; however, they generally adhere to the typical growth pattern. The World Health Organization (WHO) gauges that over 127 million children beneath five a long time ancient in creating nations will not accomplish their ideal formative potential by 2025 due to issues of destitution, malnutrition, and inadequate environments, which adversely affect children's cognitive, motor, emotional, and social development ^[1]. Agreeing to the World Health Organization (WHO), the global incidence of stunting was 22.3%, affecting 148.1 million individuals in 2022 ^[2]. In Southeast Asia, it is estimated that 14.4 million children under the age of five suffer from stunting. Despite a decrease relative to other years, it remains elevated. The World Health Organization asserts that a stunting incidence exceeding 20% constitutes a public health concern ^[3]. UNICEF statistics from 2018 indicate that over 80 percent of children suffering from stunting reside in 24 developing countries throughout Africa and Asia. The nations with the most elevated predominance of hindering among children incorporate India, China, Nigeria, and Pakistan. Indonesia is ranked third in Southeast Asia ^[3]. Stunting in toddlers (ages 0-5) is a significant worry for the government. Agreeing to the Basic Health Research (Riskesmas) findings in 2018, the prevalence of malnutrition among children in Indonesia remains significantly high, despite a decline from 37.2% in 2013 to 30.8% in 2018. According to the 2023 Indonesian Nutrition Status Survey (SSGI), the predominance of stunting in Indonesia diminished to 24.4% in 2022 and 21.5% in 2023 ^[4].

Stunting is a worldwide health concern resulting from chronic malnutrition during gestation and early

childhood, resulting in inadequate growth and compromised development. Stunting has emerged as a health concern in Indonesia due to its immediate effects on children's development, including impaired cognitive and motor skills, growth deficiencies, and metabolic abnormalities. Furthermore, hindrance has an enduring impact on young children, including reduced cognitive ability, disruption of neural structure and function, diminished learning capacity, and an increased risk of non-communicable diseases. According to the investigation of Sutarmi et al. (2022), 30.8% of children beneath five a long time ancient in Indonesia are affected by impeding factors, above the WHO threshold of 20%—infants with low birth weight (LBW) and reduced birth length ^[5].

Efforts to mitigate hindrances have been undertaken to reduce obstruction rates and have become one of the targets under the Global Nutrition Targets for 2025. The success in mitigating obstacles may serve as a crucial indicator—Economic Development Goal of Eradicating Starvation ^[1]. Child development encompasses both physical and cognitive growth from the moment of birth. Child development is influenced by various factors from prenatal stages, including nutrition and genetic traits, to postnatal conditions, encompassing dietary intake, chronic illnesses/congenital disorders, environmental factors, psychological, endocrine, social, economic, and socio-economic elements, caregiving environments, stimulation (such as infant massage), and medications ^[6].

Various intercessions can be implemented to prevent obstacles through targeted interventions utilizing developments in the health field. This intervention is also temporary, with results that may be discerned relatively quickly. Exercises that should ideally be implemented to execute specific nutritional interventions can be categorized into several primary actions, commencing from

maternal pregnancy to the birth of infants, and gentle interventions through community initiatives, especially for pregnant ladies and newborn children amid the primary 1,000 Days of Life, such as providing access to clean water, food preparation, and national health protections [7]. Alongside many interventions, nurses can mitigate stunting through targeted nursing practices. Massage therapy, particularly infant massage, is a technique that can effectively reduce stunting.

Infant massage may serve as a physical stimulus that enhances the functioning of muscles, bones, and organ frameworks. Massage stimulates the vagus nerve to improve the peristaltic function of the intestines, hence accelerating stomach emptying and increasing the infant's appetite. Moreover, kid kneading can enhance blood circulation and the digestive system [8,9].

According to research by Margaretha Gani et al. (2023), baby massage may serve as a viable intervention to prevent stunting by stimulating growth, improving digestion, and enhancing the overall well-being of infants [10]. According to the inquiry by Lestari et al. (2021), one of the non-invasive methods frequently regarded for stunting prevention is baby massage, which has demonstrated efficacy in promoting physical growth in infants, especially in weight gain [11]. The findings of the study by Fauziah et al. (2018) underscore the importance of baby kneading as an intervention to prevent stunting in young children [12].

Despite numerous investigations examining the advantages of baby massage for enhancing infant weight, the current information regarding its efficacy in mitigating stunting remains insufficient [13]. Most prior research has concentrated on premature infants or those with low birth weight and seldom investigated the impact of baby massage on children susceptible to stunting.

This review aims to assess and ascertain the current empirical evidence

regarding the efficacy of baby massage in mitigating stunting while also establishing a foundation for recommendations on baby massage interventions within stunting prevention initiatives in developing nations. The extension is expected to provide deeper insights into the efficacy of infant massage as a cost-effective intervention with the potential to mitigate stunting.

METHODS

This scoping review comprises several sources, specifically research publications, about interventions to avoid babies' stunting. The employed methodology is a scoping review designed to swiftly delineate research hypotheses from diverse sources and acquire evidence [14]. The examination and resolution of publications were performed following the Favored Announcing Things for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A Scoping review was conducted utilizing different electronic databases, including PubMed, Google Scholar, Scopus, and Garuda, employing the keywords “baby massage” OR “infant massage” AND “stunting” OR “growth” AND “development.” The criteria for article selection are determined by incorporation criteria based on PICO analysis (Population, Intervention, Comparison, Outcomes), specifying that P: Population refers to infants; I: Intervention pertains to baby massage intervention; C: Comparison involves infants not receiving baby massage; and O: Outcomes denote the results or effects of stunting prevention intervention. The inclusion criteria for the literature search encompass research publications published in international and national journals over the past five years and accessible in full text. Literature review papers are excluded from the criterion. The pertinent literature is chosen based on infant massage, stunting, stunting prevention, and growth and development. Following a scoping review under PRISMA principles, the studied literature

comprised eight papers.

Table 1. PICO

Keyword PICO	
Population	Baby
Intervention	Baby Massage, infant Massage
Comparison	Baby massage is not given to the baby
Outcomes	Stunting Prevention

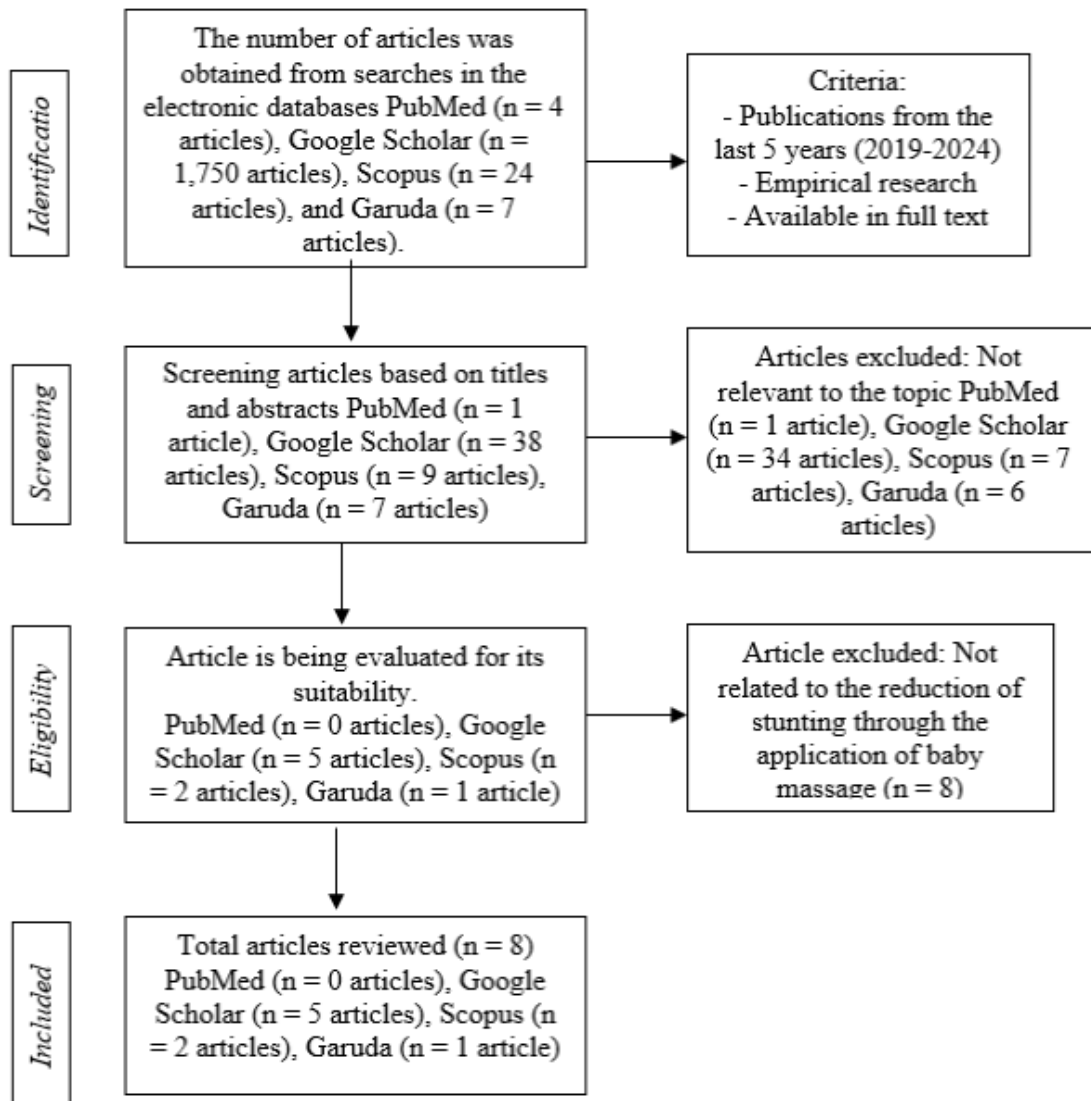


Figure 1. PRISMA Diagram

RESULT

The chosen papers are summarized and displayed in Table 1. Of the 8 publications reviewed, 7 suggest that baby massage is effective in alleviating stunting, as assessed through newborn growth and development, while 1 article discusses the use of baby SPA for the same purpose. The nurturing of children is intricately linked to the growth and enhancement of both full-term and premature infants.

Table 2. Article Summary

No	Author/ Year	Title	publisher	Objective	Method	Population and Sample	Results
A1	Sutarm, et.al/ 2022 ^[5]	Effectiveness of Healthy Massage on Growth and Development among Stunting Babies	Malaysian Journal of Medicine and Health Sciences	Assessing the efficacy of therapeutic massage on the growth and development of stunted newborns.	Quantitative true- experimental design with the pre- posttest control group	Forty-one out of 375 stunted infants were born between July and August.	A significant improvement in individual social development (p=0.03) was seen compared to the control group, along with upper arm circumference (p=0.000) and body length (p=0.019) for anthropometric measurements. Conclusion: Effective kneading is a feasible strategy for advancing the development of impaired infants.
A2	Nur S, Febriyanti, et.al / 2020 ^[15]	The Effect of Baby Massage Toward the Development of Three Months Baby	Atlantis Press SARL	Understanding the impact of infant massage on the growth and development of three- month-old babies	Quantitative research, Quasi Experiment with Pre and Post-test Without Control Group Design research design	32 babies	Baby massage influences the growth and enhancement of 3- month-old infants at the Penusupan Wellbeing Center, Pangkajene, Tegal Rule, with a p-value of 0.000.
A3	Lubis, Desi Handaya	The Effect of Baby Massage on	International Journal of Public	Understanding the impact of infant	pre- experimental with one	28 babies aged 0-12 months	1. The study revealed that among the 28

ni, et.al/ 2022 ^[16]	Growth and Health Development of Babies 0-12 Months at Mahanum Clinic	Health Excellence (IJPHE)	massage on the growth and development of children aged 0-12 months	group pretest-posttest design	respondents, prior to the infant massage, five respondents (17.9%) reported their baby's growth and development as increasing, whereas 23 respondents (82.1%) described theirs as stagnant. Following the infant massage, the number of respondents in the growing category grew to 26 (92.9%), while just 2 respondents (7.1%) remained in the fixed category.
					2. The Shapiro-Wilk normality test results reveal that the significance value for the group prior to baby massage was 0.000, which is below 0.05, indicating a non-normal distribution of the data. Likewise, following the baby massage, the significance

value persisted at 0.000, indicating that the post-massage data is likewise not normally distributed.

3. The results of the Wilcoxon hypothesis test indicate that the application of baby massage produced a z-value of -4.491, accompanied by an Asymp Sig of 0.000, which is below 0.05, implying that baby massage significantly influences the growth and development of infants aged 0-12 months at Mahanum Husada Clinic in Medan in 2022.

A4	Lestari, Kurniati Puji, et.al /2021 ^[11]	The effectiveness of baby massage in increasing infant's body weight	Journal of Public Health Research 2021	Understanding the impact of infant massage on weight gain	quasi-experimental test pre and post-test with the control group	The study comprised a sample size of 16 participants in both the intervention and control groups.	The influence of infant massage on weight gain in newborns with a history of low birth weight is significant, with a p-value < 0.05. Conclusion: Infant massage can enhance the weight of newborns with a history of low birth weight who have
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A5	Taqwin, Taqwin, et.al/ 2022 ^[8]	The Effectiveness of Baby Massage in Stunting Prevention: Study Based on Body Length Gain in Infants aged 0–3 Months	Macedoni an Journal of Medical Sciences	Understanding the impact of infant massage on the growth in length of infants aged 0–3 months	quasi-experiment	The sample had 70 respondents, evenly divided into two groups of 35 each.	<p>A distinction exists in the normal Z-Score HAZ between the treatment group (-0.548 ± 1.10) and the control group (-1.088 ± 1.03) following the infant massage. The length of the infant's body is influenced by baby massage ($p = 0.038$).</p> <p>Conclusion: Infant massage may aid children in preventing stunting.</p>
A6	Prastiwi ,Ikha & Alindawati,Rifka /2022 ^[17]	Analyzing the Influence of Improved Growth and Motor Development in 6-11 Month Old Infants at Risk of Stunting with Baby Spa Care	Jurnal Kebidanan Kestra (JKK)	To evaluate the growth and motor development enhancement of infants aged 6 to 11 months at risk of stunting through Baby SPA Care.	This research used a quasi-experimental quantitative methodology featuring a pre-test and post-test design alongside a two-group intervention format.	Thirty babies aged 6 to 11 months.	<p>Analysis indicates variations in average body weight within the treatment group, specifically among infants who did not receive Baby SPA (8,413 grams) versus those who did (8,930 grams), and infants who underwent baby massage prior to treatment (8,260 grams) compared to those who received it subsequently (8,460 grams). The disparities in average body weight and height between the infant SPA and infant massage groups were significant;</p>

							however, no significant variations were observed in average motor development.
A7	Sukamti, Sri, at.al/ 2024 ^[18]	Baby Massage is Useful in Stunting Prevention	Women, Midwives and Midwifery	Understanding the impact of newborn massage on weight gain to mitigate stunting in underweight infants.	Quasi-experimental pre-posttest one-group design	Twenty-one malnourished infants under two whose weight falls below the standard weight curve.	<p>The investigation indicates a significant correlation between infant massage and weight gain in neonates (P value 0.001; average weight during the first week 7714.29 grams, second week 7909.52 grams, fourth week 8095.24 grams, fifth week 8180.95 grams, and sixth week 8228.57 grams). A P value of 0.001 signifies a significant difference in the average weight gain of newborns from the first week to the sixth week.</p> <p>Conclusion: Consistent and repetitive infant massage, administered weekly, can help infants gain weight and prevent stunting. The suggested action is to enhance mothers' ability to massage their infants to promote independent</p>

									weight gain in the newborn.
A8	Damanik ,Nopalina Suyanti at.al/ 2022 ^[19]	The Impact of Baby Massage on Weight Pick up in Newborn children Matured 0-6 Months	Jurnal Masalah Kesehatan Indonesia	To evaluate the effect of infant massage on weight gain in infants aged 6 months at the Pagurawan Health Center in 2021.	Quantitative research uses a quasi-experimental design, employing random sampling techniques.	34 babies aged 0-6 months			The effect of newborn massage on the increase in child weight before and after the massage is significant, as the t-value (6.610) exceeds the t-table value (2.0345). Infant massage has been shown to enhance weight gain in newborns aged 0-6 months. The application of baby massage may significantly influence the increase in newborn weight both before and following the massage, as the t-value (6.610) exceeds the t-table value (2.0345). Baby massage has been shown to positively influence the weight gain of newborns.

Table 3. Stunting mitigation through implementing infant massage

Theme	Sub-theme	Explanation	Article
Mitigation of Stunting	Increase in body mass	The implementation of newborn massage seems to enhance weight gain in infants significantly.	3 (A4, A7, A8)
	Augmentation of body length	Implementing newborn massage demonstrates a notable enhancement in body length among infants.	1 (A5)
	Growth and development	Implementing baby massage significantly influences the growth and development of infants aged three months, those between zero to twelve months, and the motor skills of infants aged six to eleven months.	4 (A1, A2, A3, A6)

Eight (8) papers were reviewed to ensure the mitigation of stunting through implementing infant massage. Table 3 illustrates many ways of stunting mitigation through implementing infant massage

DISCUSSION

The newborn period encompasses rapid development that begins throughout the first 1,000 days, from pregnancy until the children reach 2 years of age. At this stage, the infant is termed to be in the golden age due to the continuous expansion of the body ^[20]. Development and improvement are fundamentally distinct phenomena that occur concurrently, are inseparable, and are connected. The optimal development and enhancement of an engine are influenced by the motivation received and the inherent potential possessed, which are subsequently interconnected with several interrelated factors, including genetic variables, bio-psycho-social variables, and behavioral and environmental variables. Baby massage is an intervention that can enhance newborn child development. This intervention is related with expanded weight gain and cognitive and engine improvement in infants ^[21]. Infant massage is among the various advantageous and healthful therapies for infants.

Furthermore, infant massage can enhance the emotional connection between parents and their offspring. Child interaction significantly enhances children's development and creativity. It improves the progress of the immune system, relaxes the infant's body, promotes growth and developmental processes, and mitigates the risk of digestive disorders and colic episodes. According to Lubis, Desi Handayani, et al. (2022), the advantages of newborn massage include promoting weight gain and growth, enhancing immunity, strengthening parent-child attachment, and increasing breast milk supply, all of which facilitate the development and enhancement of the infant ^[16]. This aligns the ponder conducted by Safitri et al. (2021), which investigated the impacts of infant massage on weight gain in 16 neonates and saw an increment in weight pick up some time recently and after the intervention ^[22]. In alignment with the findings of Safitri et al. (2021), Jubella, Morien, et al. (2024) asserted that infant massage treatment is effective in expanding the weight of infants ^[23].

Research indicates that baby massage interventions positively affect weight gain by enhancing the action of the neurotransmitter serotonin, which subsequently improves the receptor cell's ability to elevate glucocorticoids

(adrenaline, stress hormone). This phase may reduce adrenaline hormone levels, which will ultimately enhance the body's immunity, particularly IgM and IgG. Infant massage can improve sleep quality and increase alertness or focus, as effective massage may modify brain wave patterns. Furthermore, infants who receive regular massages exhibit a more robust immune system and demonstrate accelerated motor development than those who do not receive such treatments ^[19]. Development and progress are constant aspects of human existence, commencing from the embryo within the womb, with one of the headways in infants being the initial stage of net and fine engine improvement ^[24]. Stimulation is essential to avert developmental delays. Tactile stimulation, including infant massage, significantly enhances the overall motor skills of babies in sitting and crawling independently ^[25]. This aligns with the inquiry undertaken by Kornalia et al. (2023), which attests the viability of infant massage on motor development in infants aged 3 months following the intervention ^[26].

The initiative to employ baby massage techniques as a stunting prevention strategy for toddlers requires the endorsement of moms who are well-equipped and possess a comprehensive understanding of the effects of child massage on infants. Salamah & Adelia (2021) identified various characteristics influencing awareness of baby massage, including maternal age, education, occupation, socioeconomic position, and information sources. Community health nurses must anticipate these considerations while implementing interventions to avoid stunting events through baby massage ^[27]. A study by Erçelik & Yılmaz (n.d., 2023) examined the efficacy of infant massage on child development, mother-infant bonding, and maternal confidence over a 20-week online period, revealing an increase in weight and height by the 8th and 20th weeks. This intervention can also improve the mother-child bond ^[28].

The literature review indicates that baby massage can effectively enhance infant body length growth, a crucial factor in predicting stunting ^[8]. Research by Asih, Yusari, and I Gusti Ayu Mirah (2019) substantiates significant differences in the increase of body length and head circumference in infants who underwent child massage and spa compared to those who did not ^[29]. Numerous prior research endorses infant massage's advantages for newborns' growth and progress. For instance, Yuniati's (2021) investigation indicates that child massage enhances weight gain in infants ^[30]. The investigation by Campbell, Megan (2021) emphasizes the effect of massage the development rate of premature infants ^[31]. Consistent with Campbell's (2021) investigation, a study by Putrama, Christina Dhian Adhi et al. (2024) involving 18 low birth weight neonates treated at RSUD DR Soediran Mangun Sumarso Hospital in Wonogiri Regency indicated an increase in weight among low-birth-weight infants following the administration of infant massage ^[32].

Infant massage can strengthen the vagus nerve, enhance the efficiency of intestinal peristalsis and result in accelerated stomach emptying. This enhances hunger and food consumption, hence facilitating weight gain. Moreover, infant massage stimulates general blood circulation, thus improving nutrient absorption and metabolism. In addition to physical advantages, infant massage enhances the connection between parents and their children ^[11]. Numerous prior research corroborates the conclusions of Lestari et al. For instance, Pados (2019) conducted studies that yielded similar outcomes in premature infants, counting shorter healing center remains, diminished torment, improved weight gain, nutritional tolerance, and neurological development following regular massages administered by parents ^[13]. Moreover, the investigation by Febriyanti et al. (2020) underscores the impact of rub on the developmental rate of

three-month-old infants ^[15]. Additional research supporting this assertion includes a study by Junita et al. (2022), which indicates that infant massage can enhance weight gain due to the vagus nerve stimulation, influencing the absorption mechanism and thereby improving digestive function in infants, ultimately enhancing nutrient assimilation. This will cause infants to feel hungry quickly and increase the frequency of nursing, resulting in significant weight gain ^[33].

Sukanti's inquiry regarding 2024 revealed that infant massage effectively elevates infants' weight from underneath the WHO standard ruddy line bend to over the normal ordinary bend inside six weeks post-massage. Consent to this investigation indicates that neonatal massage will effectively prevent future obesity, as it contributes to weight gain in infants ^[18]. This study underscores the significance of physical stimulation in promoting normal growth in stunted newborns.

Sutarmi's (2022) research findings underscore the efficacy of solid food interventions in enhancing the growth and development of infants diagnosed with stunting. A notable enhancement has been observed in growth indicators, including weight, height, upper arm condition, and head condition, alongside developmental indicators such as social, personal, gross motor, fine motor, and language skills ^[5]. This research aligns with Simanihuruk (2017) findings that baby massage significantly enhances the development and improvement of newborns aged 6-12 months ^[34]. The research conducted by Kurniawati and Ade (2020) substantiates that baby SPA influences the weight and length of infants ^[35]. The study by Prastiwi, Ikha, and Rifka Alindawati in 2022 concluded that infant spa significantly influences motor development and weight gain in infants ^[17].

CONCLUSION

This review identified significant benefits of infant massage for the development and progress of newborns, including efforts to prevent stunting. Consistent infant massage can promote weight and height gain, augment immunity, facilitate motor development, reinforce parent-child attachment, enhance hunger and food consumption, and improve the quality of the infant's sleep.

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