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Improving Gross Motor Skills in Infants Aged 6-12 Months Through Infant Massage

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ABSTRACT

Background: Baby massage is a non-pharmacological intervention that can help accelerate growth and development stimulation in infancy. Suboptimal gross motor development can increase the risk of developmental delays and motor coordination disorders in the future. **Objective:** This study aims to determine the effect of baby massage on improving gross motor development in babies aged 6–12 months at Ohana Baby Spa Ngunut Tulungagung . **Methods:** This study used a quantitative design with a pre-experimental one-group pretest-posttest design. The population in this study was all babies who visited Ohana Baby Spa, with a sample of 35 respondents taken using the purposive sampling technique. Gross motor development was measured using the Pre-Screening Development Questionnaire (KPSP) observation sheet before and after the infant massage intervention . **Results:** The results of the study showed that before the intervention, most respondents were in the doubtful category (score 7–8), namely 54.3%, while after being given the intervention for two weeks, the majority of respondents increased to the appropriate category (score 9–10), namely 62.9%. Data analysis using the Wilcoxon Signed Rank Test obtained a z value = -5.444 with a p value = 0.000 ($p < 0.05$) which indicates a significant effect of infant massage on gross motor development. **Conclusion:** Baby massage is effective in helping stimulate gross motor skills in babies aged 6–12 months. Therefore, baby massage can be recommended as part of routine stimulation care to support optimal growth and prevent developmental delays in babies.

Keywords: Baby Massage; Gross Motor; babies 6–12 months.

Background

The life phase between the ages of 6 and 12 months is one of the most dynamic periods in a child's growth and development cycle (1). This period is often referred to as the golden period or window of opportunity, where the brain's neural circuits experience very rapid maturation (2). One of the main indicators that marks the success of growth and development in this phase is gross motor maturity (3). Gross motor skills, such as rolling over independently, sitting without support, crawling, and the ability to pull the body up to stand, are not just static physical milestones (4). These movements that involve large muscle activity are the main modality for babies to explore space, stimulate cognitive skills, build a visual-spatial coordination system, and foster early self-confidence in children (5).

This currently indicates a real threat to the optimization of motor function. According to UNICEF in 2020, data obtained showed that the incidence of growth and development disorders in toddlers, especially motor development disorders, was still high (27.5%) (6). According to the National Socio-Economic Survey conducted by the Central Statistics Agency in 2023, there were 30.2 million early childhood children in Indonesia aged <1 year, 11.22% of whom experienced developmental disorders (7). In Indonesia, the rate of delay in child development is quite high, namely 16% of babies in Indonesia experience fine and gross motor disorders, hearing disorders, intelligence disorders and speech disorders (8). Based on the DDST in Indonesia in 2020, 25% of children experienced poor motor development, including fine and gross motor skills (9). The results of the developmental examination were found to be normal for age in 53%, questionable (requiring further examination) in 13%, and developmental deviations in 34%. Of the developmental deviations, 30% were fine motor skills (such as writing, holding), 44% were speech and language, and 16% were independent socialization (10). If gross motor delays at the age of 6–12 months are left without early intervention, this will trigger a domino effect, starting from fine motor delays, impaired body coordination during preschool age, to hampered independence in children's daily activities (11).

One of the preventive measures that can be taken is to provide stimulation to the baby, such as giving baby massage (12). Physiologically, structured massage provides tactile (touch) and kinesthetic stimulation to the baby's skin receptors and muscle tissue (13). This mechanical touch triggers increased blood circulation and lymphatic flow, which optimizes the supply of nutrients and oxygen to large muscles such as the back, thighs, and arms (14). Furthermore, baby massage stimulates the central nervous system through the release of growth hormones, reduces cortisol (stress) hormones, accelerates the myelination process (maturation of nerve sheaths), and stimulates increased muscle tone and joint flexibility (15). The combination of these physiological effects makes the baby's muscles more ready, strong, and coordinated to perform more complex motor activities (16).

Several studies have shown that baby massage provides benefits for the growth and development of babies, such as improving sleep quality, increasing weight gain, improving blood circulation, and supporting motor development (17)(18). Several studies report that babies who receive regular massage have better motor development than babies who do not receive massage (19)(20). However, the results of existing research still show variations in effectiveness which are influenced by the frequency of massage, the age of the baby, massage techniques, and the characteristics of different respondents (21)(22). In addition, most previous studies have focused more on examining the effects of infant massage on weight gain, sleep quality, or general development without specifically examining gross motor development in infants aged 6–12 months, which is a critical period for achieving motor milestones. Research that specifically evaluates the effectiveness of infant massage on gross motor skills in infants aged 6–12 months is still limited, especially in baby spa service settings which are currently increasingly being utilized by the public.

Baby massage is carried out considering the high rate of delayed motor development in babies and the importance of early stimulation to optimize child growth and development (23). Baby massage is a form of stimulation that is safe, easy to apply, non-invasive, and relatively affordable (24). However, the effectiveness of baby massage on gross motor development in babies aged 6-12 months still requires more specific scientific evidence, especially in baby spa service facilities, therefore, the author is interested in conducting research entitled "The Effect of Baby Massage on Gross Motor Development in Babies Aged 6-12 Months"

Methods

Design of the research is quantitative with an experimental analytical design of the pre-experimental type with a pretest-post test one group design approach. The time of the research was carried out in October 2025. The research was conducted at Ohana Baby Spa. The population in this study were babies aged 6-12 months at Ohana baby spa on average every 3 months between January-March 2025 totaling 38. The number of samples in this study was 35 babies aged 6-12 months which had been calculated using the sample size formula from Slovin. The sampling technique in this study was purposive sampling with inclusion criteria being babies aged 6-12 months. Exclusion criteria were babies aged 6-12 months who had a fever or suffered from chronic diseases and babies aged 6-12 months with disabilities or neurological disorders. The data collection method began with the researcher providing a brief explanation of the purpose of the research and the impact of the research. If the respondent agreed to participate in the research activities, then a consent form was given to be signed. A questionnaire containing general respondent data was distributed, and a pretest was conducted using a gross motor observation sheet (DDST) with the Denver Developmental Screening Test (DDST). Respondents receiving infant massage (intervention) were then guided to perform the massage according to the standard operating procedure (SOP). The intervention was repeated four times over two weeks, with each massage lasting 30 minutes. A gross motor assessment was then conducted, including the DDST.

Two types of instruments were used in this study: a general respondent data sheet and a DDST observation sheet. Since the data scale was ordinal and paired, the Wilcoxon Signed Rank Test was used with a significance level of $\alpha = 0.05$.

Results

Table 1. Frequency Distribution of Respondents of Babies Aged 6–12 Months

No	age (Mounth)	Total	Precentage (%)
1.	6-12 bulan	35	100
Total		35	100
No	Sex	Total	Precentage (%)
1.	Man	17	48,6
2.	Woman	18	51,4
Total		35	100
No	Baby Massage	Total	Precentage (%)
1.	Yes	25	71,4
2.	No	10	28,6
Total		35	100
No	Gros Motor (pre-test)	Total	Precentage (%)
1.	Delayed (≤ 6)	6	17,1
2.	Suspect (7-8)	19	54,3
3.	Normal (9-10)	10	28,6
Total		35	100
No	Frequency post	Total	Precentage (%)
1.	Delayed (≤ 6)	1	2,9
2.	Suspect (7-8)	12	34,3
3.	Normal (9-10)	22	62,9
Total		35	100
			Z -5,444
			Asymp. Sig. (2-tailed) 0,000

It was found that all 35 infants (100%) were aged 6–12 months. Based on gender, the majority of respondents were female (18 infants (51.4%), while 17 were male (48.6%). Based on mothers' experience with massaging their babies, the majority of respondents had received infant massage (25 infants (71.4%), while 10 infants (28.6%) had never received infant massage. The results of the DDST measurements before the infant massage (pre-test) showed that the majority of respondents were in the doubtful category (7–8), with 19 infants (54.3%). After the infant massage (post-test), there was a change in the distribution of developmental categories. The majority of respondents were in the appropriate category (9–10), with 22 infants (62.9%).

The Wilcoxon Signed Rank Test yielded a Z-score of -5.444 with an Asymp. Sig. (2-tailed) of 0.000. Since the significance value is $0.000 < 0.05$, H_0 is rejected and H_1 is accepted. This indicates that there is a significant effect between before and after the intervention. This means that there is an effect of baby massage on improving the development of babies aged 6–12 months based on the results of the DDST at Ohana Baby Spa Ngunut Tulungagung in October 2025.

Discussion

The age period of 0–12 months is the golden period which determines the quality of a child's growth and development in the next stage (2). If there is a delay in development at this stage and the appropriate stimulation is not immediately provided, this condition can have an impact on the next stage of development (25). Based on research results, the gross motor development of babies aged 6–12 months before being given infant massage intervention was mostly in the suspect or doubtful category. This condition shows that the lack of routine and optimal stimulation from parents can affect the achievement of the baby's motor development (26). Inadequate stimulation, especially in the form of touch, physical activity and movement exercises, has the potential to cause the baby's motor development to be in the doubtful category or even experience deviations (18).

The results of this study are in line with research which states that before being given stimulation

in the form of baby massage, most respondents were in the doubtful development category based on the results of the DDST (27). The study also showed that babies who rarely received tactile stimulation had lower motor development scores compared to babies who received stimulation regularly (28). This finding strengthens the assumption that early stimulation is an important factor in supporting the motor development of babies, because at that age the neuromuscular system is still in the maturation stage and is very responsive to stimuli from the environment (4).

After being given regular baby massage treatment for two weeks, the research results showed a significant increase in gross motor development in babies aged 6–12 months. Posttest frequency distribution data shows that the majority of respondents are in the normal development category according to their age stage. This increase indicates that providing baby massage regularly and according to procedure can be an effective form of stimulation in supporting the development of babies' gross motor skills (29). Observation results showed that after the intervention, babies had better ability to control large body movements involving the muscles of the neck, back, arms, and legs (30). Babies appear to be more active in performing various spontaneous movements, such as lifting their heads when lying on their stomachs (tummy time), moving both arms and legs symmetrically, rolling over, maintaining a sitting position with assistance, and showing better motor coordination compared to before the intervention (31).

These findings are also supported by several previous studies which state that infant massage stimulation given twice a week for 14 days contributes to improving infant motor skills, especially in the skills of sitting, crawling, and standing holding on (22). Baby massage provides sensory stimulation through touch that can activate receptors in the skin and is transmitted to the central nervous system, thereby helping the process of sensory integration and the development of motor functions (18). In addition, baby massage can also increase blood circulation, improve the supply of oxygen and nutrients to body tissues, and increase muscle tone and flexibility which play an important role in the development of motor skills (32).

The results of further analysis revealed that there was a real and significant difference in the gross motor skills of infants between before and after infant massage, which confirmed that this intervention had a positive impact on the gross motor development of infants aged 6–12 months. These findings indicate that tactile and kinesthetic stimulation provided through infant massage plays a role in supporting the maturation process of the neuromuscular system so that babies are able to perform gross motor movements according to their developmental stages (33). Improved gross motor skills after infant massage also indicate improved muscle coordination, body balance, and better movement control (23).

Physiologically, the touch given during baby massage can stimulate the release of hormones and neurotransmitters that play a role in the growth and development of the nervous system (14). This stimulation can also increase vagus nerve activity which influences metabolic function, body relaxation, and the baby's sleep quality (34). A more relaxed and comfortable body condition allows the baby to have more optimal energy to explore the environment and train his motor skills (35). Therefore, infant massage can be considered an effective form of early stimulation to support infant growth and motor development, especially in the early stages of life, which is a crucial period in the development of motor skills and neurological function. The findings of this study align with various previous studies that have shown that infant massage can enhance motor development through increased blood circulation, muscle relaxation, continuous sensory stimulation, and optimization of nervous system function, which supports the infant's overall motor development.

Conclusions and Recommendations

The findings suggest that baby massage can serve as an effective form of early stimulation to support infant growth and development. Through tactile stimulation and improved parent–infant interaction, baby massage may help optimize neuromuscular function, body coordination, and motor skill acquisition during a critical developmental period. Therefore, baby massage can be considered a beneficial complementary intervention to promote healthy gross motor development in infants.

Based on these findings, parents are encouraged to incorporate baby massage into routine infant care practices using appropriate techniques and guidance from trained health professionals. Healthcare providers should continue to educate and support families regarding the benefits of baby massage as part of early developmental stimulation programs. Health institutions may also consider integrating baby massage education into maternal and child health services to enhance developmental outcomes among

infants.

Ethical Consideration and Competing Interest

This research has received ethical approval from STIKes Patria Husada Blitar No.06/PHB/KEPK/370/12.25. There is no conflict of interest, either financial or non-financial, that could influence the implementation of the research, data analysis, interpretation of the results, or preparation of this research manuscript.

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