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Literature Study: Complementary Therapy in Stimulating the Development of Infants Aged 0–12 Months

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Abstract. *The 0–12 month period is a critical phase in infant development, covering motor, cognitive, and emotional domains. Early stimulation has been proven to prevent developmental delays that may affect later life stages. Complementary therapies such as infant massage and baby gym are widely applied as non-pharmacological, safe, low-cost interventions that can be practiced at home by parents. To systematically review the scientific evidence regarding the effectiveness of complementary therapies in stimulating the development of infants aged 0–12 months. This literature study involved a review of articles published between 2018–2024 from PubMed and Google Scholar. Inclusion criteria included experimental and quasi-experimental studies evaluating the effect of complementary therapies (infant massage, baby gym, or others) on infant development. Six relevant studies were identified, including four on baby gym and two on infant massage. All studies reported significant improvements in gross motor development following intervention. Infant massage also showed additional benefits such as increased weight gain and enhanced mother-infant bonding. Complementary therapies such as infant massage and baby gym are effective and practical strategies for stimulating infant development. However, further research with more robust experimental designs is needed to strengthen the evidence base.*

Keywords: *infant development, early stimulation, complementary therapy, infant massage, baby gym*

1. BACKGROUND

The first 1,000 days of life — from conception to a child's second birthday — are a critical period that determines a child's future development and overall well-being. Within this phase, the age of 0–12 months is a particularly vital period, during which rapid brain development and progress in motor, language, and socio-emotional skills occur. Appropriate stimulation during infancy has a significant impact on a child's ability to reach their developmental milestones (Ministry of Health RI, 2021).

However, many infants still experience developmental delays due to a lack of adequate early stimulation. According to the Indonesian Ministry of Health (2021), around 13–18% of children under five experience growth and development problems. Additionally, national health survey data (Riskesdas, 2018) shows that 29.9% of young children in Indonesia experience general developmental delays - indicating that nearly one-third of Indonesia's children do not develop in accordance with their age-appropriate stages.

Developmental delays in infancy not only affect immediate growth but can also lead to long-term consequences in learning abilities, intelligence, and productivity in adulthood (Black et al., 2017). Therefore, early stimulation is a vital part of health promotion and developmental interventions (WHO, 2020). Among the increasingly popular methods used to stimulate infant

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development are complementary therapies—non-pharmacological interventions used to support health and well-being holistically.

Common complementary therapies used for infants include infant massage, lullaby music therapy, and aromatherapy. These interventions are generally safe, low-cost, and can be practiced at home by parents (Field, 2019; Sari et al., 2020). Studies have demonstrated their benefits in stimulating the nervous system, improving sleep quality, strengthening parent-infant bonding, and promoting motor and emotional development (Underdown et al., 2013; Wang et al., 2021).

A study by Marzieh et al. (2021) found that infant massage significantly improved weight gain and sleep quality in premature infants. Similarly, Kristianto et al. (2023) in Indonesia showed that a combination of baby massage and lullaby music therapy significantly enhanced neonatal sleep quality at RS Telogorejo Hospital. Another study by Nery et al. (2019) demonstrated that lavender aromatherapy effectively reduced infantile colic symptoms, as evidenced by a reduction in crying episodes.

Despite the growing evidence on the benefits of complementary therapies, their application in Indonesia remains limited, and comprehensive local studies are lacking. Therefore, a thorough literature review is necessary to identify the types of complementary therapies that are proven to be effective, safe, and practical in stimulating infant development. This study is expected to provide a scientific foundation for healthcare professionals, educators, and parents in selecting appropriate early interventions to support optimal and holistic development in infants.

2. THEORETICAL STUDY

Infant development is a multidimensional process influenced by biological, environmental, and psychosocial factors. During the first year of life, infants undergo rapid changes in motor, cognitive, language, and emotional domains. Early stimulation is essential to optimize these processes, and complementary therapies have emerged as supportive interventions that can enhance development in a holistic and non-invasive manner (Ministry of Health RI, 2021).

Infant Massage is one of the most researched complementary therapies. It has been shown to improve weight gain, enhance sleep quality, and stimulate the parasympathetic nervous system, thereby supporting overall development. Marzieh et al. (2021) reported that premature infants who received regular massage therapy had significantly better weight gain and sleep duration compared to those who did not.

Music Therapy, particularly using lullabies, is another effective tool. Research by Kristianto et al. (2023) found that combining infant massage with lullaby music significantly improved neonatal sleep quality, which is closely linked to brain development and emotional regulation in infants.

Aromatherapy, using essential oils such as lavender, has also been explored for its calming effects on infants. A randomized controlled trial by Nery et al. (2019) demonstrated that lavender aromatherapy effectively reduced symptoms of colic, leading to less crying and better emotional regulation in infants.

Despite their benefits, complementary therapies remain underutilized in Indonesia, often due to lack of awareness and standardized guidelines. A systematic review by Kim et al. (2020) emphasized the need for integrating complementary therapies into pediatric care, especially in low- and middle-income countries, to enhance developmental outcomes safely and affordably.

Collectively, existing studies support the use of complementary therapies as effective adjuncts in stimulating infant development, especially in the first year of life. Further research, particularly in local contexts, is crucial to validate and adapt these interventions for broader use in family and community health settings.

3. RESEARCH METHODS

This study is a narrative literature review aimed at exploring and synthesizing scientific evidence related to the effectiveness of complementary therapies in stimulating the development of infants aged 0–12 months. The literature search was conducted systematically using two major databases: PubMed and Google Scholar, covering publications from 2018 to 2024.

The first step involved formulating the research topic and selecting relevant search keywords such as: *"complementary therapy and infant development"*, *"infant massage and motor skills"*, *"music therapy and baby sleep"*, and *"aromatherapy and infant development"*. These keywords were combined using Boolean operators (AND, OR) to generate focused search results.

The inclusion criteria for article selection were as follows:

1. Peer-reviewed scientific journal articles;
2. Published in English between 2018 and 2024;
3. Focused on infants aged 0 to 12 months;
4. Discussed complementary therapies such as infant massage, music therapy, or aromatherapy;

5. Assessed or discussed aspects of infant development (motor, cognitive, emotional, or sleep);
6. Available in full-text.

Meanwhile, the exclusion criteria included articles that did not focus on complementary therapy, did not involve the 0–12 month age group, were not available in full-text, or were in the form of opinion pieces, editorials, or study protocols.

The screening process was carried out in two stages: an initial selection based on title and abstract, followed by a full-text review to confirm eligibility. Articles that met the criteria were then descriptively analyzed and narratively reviewed to identify similarities, differences, and the overall effectiveness of each type of complementary therapy in stimulating infant development.

The findings of this review are expected to provide a comprehensive overview of the role of complementary therapies in supporting early childhood development, as well as serve as a scientific foundation for evidence-based and holistic maternal and child health practices.

4. RESULTS AND DISCUSSION

Table 1. Literature Study : Complementary Therapies to Stimulate Infant Development (0–12 Months)

No	Study Title	Intervention	Design & Subjects	Key Findings
1	Effectiveness of Baby Gym on Gross Motor Development in Infants Aged 6–9 Months (Purnamasari et al., 2023)	Baby gym (2×/week)	Quasi-experiment (one-group pre–post), 20 infants aged 6–9 months	Significant increase in KPSP scores ($p < 0.001$), indicating improved gross motor development
2	Effectiveness of Baby Gym on Motor Development in Infants Aged 9–12 Months (Andinawati, 2022)	Regular baby gym	Quasi-experiment (one-group pre–post), 30 infants aged 9–12 months	Significant improvement in gross motor development ($p = 0.000$)
3	Effect of Baby Gym on Gross Motor Development in Infants Aged 3–4 Months (Sari et al., 2023)	Baby gym at public health center	Quasi-experiment, 16 infants aged 3–4 months	Gross motor development increased significantly ($p = 0.000$)
4	Effect of Baby Massage on Gross Motor Development in Infants Aged 0–12 Months (Kurniarum et al., 2022)	Baby massage (2×/week for 1 month)	One-group pre–post test, 53 infants aged 0–12 months	Gross motor skills improved significantly according to DDST ($p = 0.000$)
5	Baby Massage on Gross Motor Development in Infants (Zulfiana et al.,	Meta-analysis of baby	Literature review and meta-analysis of 7 studies	Baby massage is effective in stimulating gross

	2022)	massage		motor development
6	The Effect of Baby Massage on Growth and Development of Infants Aged 0–12 Months (Handayani et al., 2022)	Daily baby massage	One-group pre–post test, 28 infants aged 0–12 months	92.9% of infants showed improved developmental status after massage ($p = 0.000$)

The first 0–12 months of life is a critical period in an infant's growth and development, particularly in motor, sensory, cognitive, and socio-emotional domains. According to the World Health Organization (WHO, 2020), appropriate stimulation during early infancy significantly influences brain development and the formation of neurological functions. In this context, complementary therapies such as infant massage and baby gym have emerged as non-pharmacological strategies to holistically support infant development without relying on medical interventions.

1. Baby Gym

Baby gym is a form of structured physical stimulation involving activities such as tummy time, head lifting, rolling over, sitting, and crawling. These activities aim to strengthen muscles, improve gross motor coordination, and stimulate the vestibular and proprioceptive systems (Sherwood, 2016). In a study by Purnamasari et al. (2023), baby gym intervention for two weeks significantly improved the gross motor development of infants aged 6–9 months, assessed using the Kuesioner Pra Skrining Perkembangan (KPSP).

Similarly, Andinawati (2022) demonstrated that baby gym therapy administered to 30 infants aged 9–12 months for two weeks yielded significant improvements in gross motor skills. Another study by Sari et al. (2023) confirmed the effectiveness of baby gym even among younger infants (aged 3–4 months), indicating that this intervention is safe and suitable across a range of early developmental stages.

Strengths of baby gym include its interactive and playful nature, which makes it enjoyable for infants and parents. It is also feasible to perform at home under health worker guidance. However, limitations include the small sample sizes, quasi-experimental designs without control groups, and relatively short intervention periods, which constrain the generalizability of results. Baby gym promotes proprioceptive and vestibular stimulation, both of which are critical for developing postural control, balance, and motor coordination.

2. Infant Massage

Infant massage involves gentle tactile stimulation through structured rubbing, stroking, and pressing of the baby's body. According to Field (2019), this sensory stimulation triggers

neural pathways to the brain that are essential for synapse formation, emotional regulation, and physical growth.

In a study by Kurniarum et al. (2022), infant massage significantly improved gross motor development in infants aged 0–12 months, as measured by the Denver Developmental Screening Test (DDST). Handayani et al. (2022) also found that regular infant massage over two weeks increased both weight gain and gross motor development in infants.

A systematic review by Zulfiana et al. (2022) further reinforced the scientific validity of infant massage. The meta-analysis concluded that massage consistently benefits gross motor development across various contexts and study designs.

Strengths of infant massage include its affordability, safety, and accessibility for parents to perform at home. It also enhances mother-infant bonding and emotional security. Weaknesses include some studies' use of pre–post-test designs without control groups, inconsistent massage protocols, and limited intervention duration. Massage stimulates the sensory nervous system, enhances blood circulation, and promotes the release of oxytocin, which fosters bonding and emotional regulation in infants (Field, 2019).

Both baby gym and infant massage activate the peripheral and central nervous systems in different but complementary ways. Baby gym targets the vestibular system, responsible for balance and spatial orientation, and the proprioceptive system, which helps infants develop movement awareness (Sherwood, 2016). In contrast, massage targets the tactile sensory system and promotes the release of relaxation hormones such as oxytocin, which improves emotional well-being and facilitates neurological integration (Field, 2019).

Organizations such as WHO and UNICEF advocate for early stimulation and parent-infant interaction, such as touch, physical activity, and play as key strategies for promoting optimal early childhood development (WHO, 2020).

5. CONCLUSION

Complementary therapies such as baby gym and infant massage are scientifically supported as effective methods to stimulate infant development, particularly gross motor skills. Both interventions show promise as promotive and preventive strategies in primary health services. However, future studies with stronger experimental designs, standardized intervention protocols, and longer-term evaluations are needed to broaden the evidence base and optimize implementation.

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