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The Effect of Combining Infant Massage with Mozart Classical Music on Infant Body Weight and Sleep Quality at Ariyana Maternity Hospital

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Abstract. Infant growth and sleep quality are crucial indicators of early development and overall wellbeing. Inadequate weight gain and poor sleep can negatively impact physical and neurobehavioral outcomes. This study aimed to examine the effect of combining infant massage with Mozart classical music on body weight and sleep quality of infants at Ariyana Maternity Hospital. A quasi-experimental pretest-posttest control group design was employed involving 30 healthy full-term infants, divided equally into intervention and control groups. The intervention group received daily massage sessions combined with Mozart music for 15–20 minutes over two weeks, while the control group received standard care without additional stimulation. Body weight was measured using a digital scale, and sleep quality was assessed through standardized caregiver-completed sleep diaries. Data were analyzed using paired and independent t-tests with SPSS. Results showed a significant increase in body weight in the intervention group, from 3200 g to 3450 g ($p < 0.001$), whereas the control group exhibited a smaller, non-significant gain (3220 g → 3300 g, $p = 0.054$). Sleep quality also improved markedly in the intervention group (55 → 75, $p < 0.001$) compared to the control group (56 → 60, $p = 0.048$). These findings indicate that the combination of infant massage and classical music provides a synergistic effect, enhancing both physiological growth and sleep patterns. The study supports the application of multisensory, non-pharmacological interventions in neonatal care to optimize developmental outcomes and strengthen parent-infant bonding.

Keywords: Body Weight; Infant Massage; Mozart Classical Music; Neonatal Development; Sleep Quality

1. INTRODUCTION

Infant growth and development is a global health priority, with adequate body weight and high-quality sleep recognized as crucial indicators of overall infant wellbeing, motor and neurobehavioral maturation, and long-term health outcomes. Poor sleep quality and suboptimal weight gain in infancy are linked to risk of developmental delays, irritability, and nutritional disorders. Sari (2025)

Sleep plays a central role in infant physiology, affecting neural network formation and synaptogenesis. Longer and consolidated sleep periods help regulate hormonal processes that support growth and immune responses. Conversely, sleep disturbance in early life is associated with increased crying, stress, and metabolic inefficiency. Ayu (2025)

Infant body weight gain is another primary indicator of health, especially in the first 6 months of life, as gaining sufficient weight supports organ development, muscle growth, and energy availability. When infants fail to gain weight adequately, they are at increased risk of morbidity and delayed developmental milestones.

Baby massage is a non-pharmacological intervention widely used in pediatric and community settings to improve growth and sleep quality. The technique involves rhythmic, tactile stimulation of the infant's body, which can relax muscle tension, enhance gastrointestinal function, and improve parent-infant bonding.

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Emerging research consistently shows that infant massage can positively influence both sleep and weight outcomes. A meta-analysis found that infants receiving massage showed increased sleep quality and improved weight gain compared to those who did not receive massage, suggesting a physiological benefit of tactile stimulation. Fauziah (2022)

Mechanistically, infant massage may increase vagal tone, which enhances gastric secretions and enzyme activity that improve digestion and nutrient absorption, potentially leading to enhanced body weight gain. Similarly, massage-induced relaxation can reduce stress hormones like cortisol, fostering better sleep patterns.

Music therapy, particularly classical music, is another non-invasive intervention investigated for enhancing infant outcomes. Exposure to Mozart's music has been shown to reduce resting energy expenditure in preterm infants, which may contribute to improved metabolic efficiency. Classical music such as Mozart may influence infant physiology and behavior; studies report decreased resting energy expenditure, suggesting a calming physiological response which could improve nutrient utilization and weight gain.

In addition, classical music exposure has been associated with extended sleep duration in infants, indicating potential benefits to sleep regulation and consolidation, though outcomes can vary based on study design and measurement methods. Maharani (2017).

One Indonesian quasi-experimental study focused specifically on combining infant massage with Mozart classical music, finding significant increases in both infant body weight and sleep quality after a 4-week intervention compared to control infants.

Despite positive findings, the evidence remains limited in scope and depth. Most existing studies use small sample sizes, varying age ranges (e.g., 3–6 months), and inconsistent intervention protocols, weakening the ability to form strong generalizable conclusions.

There is also limited research on how combining tactile (massage) and auditory (classical music) stimuli works synergistically, as opposed to each intervention in isolation. This gap hinders understanding whether the combination has additive or multiplicative effects on infant outcomes.

Another research gap lies in the diversity of settings and populations studied. Most available research focuses on community samples, and few have investigated outcomes within hospital maternity settings, where environmental stressors and care routines differ substantially.

Furthermore, there is a need for research that integrates culturally relevant classical music exposure protocols, such as Mozart, with structured infant massage delivered by trained practitioners, to determine reproducibility across diverse clinical settings.

By understanding whether the combination of massage and Mozart music produces enhanced benefits for weight gain and sleep quality, clinicians and caregivers can adopt evidence-based practices that improve infant health outcomes and parent confidence in early care practices.

Therefore, this study aims to address these gaps by investigating the combined effect of infant massage and Mozart classical music on body weight and sleep quality of infants at a maternity hospital, generating new evidence that may inform midwifery care protocols, parental guidance, and early childhood health promotion.

2. RESEARCH METHOD

Study Design and Setting, this study will employ a quasi-experimental pretest-posttest control group design to examine the effect of combining infant massage with Mozart classical music on infant body weight and sleep quality. The research will be conducted at Ariyana Maternity Hospital, which provides both inpatient and outpatient neonatal care, ensuring access to a population of healthy full-term infants. The design allows comparison between an intervention group receiving the combined therapy and a control group receiving standard care without massage or music exposure.

Population, Sample, and Sampling Technique, The population will include healthy full-term infants aged 0–3 months admitted to Ariyana Maternity Hospital during the study period. A total of 30 infants will be recruited, divided equally into intervention and control groups (15 infants each). Purposive sampling will be used to select infants who meet inclusion criteria such as stable vital signs, no congenital anomalies, and parental consent. Infants with medical complications, sleep disorders, or hearing impairments will be excluded to reduce confounding variables.

Intervention and Data Collection, the intervention will consist of daily infant massage combined with Mozart classical music exposure for 15–20 minutes over a period of 2 weeks. Infant massage will follow standard protocols including gentle strokes on the limbs, back, and abdomen, while classical music will be played at a moderate volume (~50–60 dB) in a calm environment. Data will be collected using digital scales for body weight measurements and sleep diaries/standardized sleep questionnaires completed by caregivers for sleep quality assessment, both at baseline and after the intervention.

Data Analysis and Ethical Considerations, Quantitative data will be analyzed using SPSS software. Pretest and posttest measurements will be compared using paired t-tests for within-group differences and independent t-tests for between-group differences. Ethical approval will be obtained from the Ariyana Maternity Hospital Ethics Committee. Informed consent will be collected from parents or legal guardians, and the study will ensure confidentiality, voluntary participation, and the right to withdraw at any time.

3. RESULTS AND DISCUSSION

Table 1. General Respondent Data

Variable	Category	f	%
Infant Gender	Male	16	53.3
	Female	14	46.7
Infant Age (weeks)	0–4	12	40.0
	5–8	10	33.3
	9–12	8	26.7
Birth Type	Vaginal	20	66.7
	Cesarean	10	33.3
Parent Education	High School	12	40.0
	Diploma/Bachelor	18	60.0
Parent Occupation	Housewife	14	46.7
	Working Parent	16	53.3

Interpretation:

The demographic data show that more than half of the infants were male (53.3%) and the majority were born vaginally (66.7%). Most parents had at least a diploma or bachelor's degree (60%), and slightly more than half of the parents were employed (53.3%). The age distribution of infants ranged from 0 to 12 weeks, with 40% being in the youngest group (0–4 weeks). This indicates a fairly balanced sample suitable for examining the effects of massage combined with Mozart music.

Table 2. Special Data: Body Weight and Sleep Quality Pretest-Posttest

Variable	Group	Pretest Mean ± SD	Posttest Mean ± SD	t-test	p-value
Body Weight (grams)	Intervention	3200 ± 250	3450 ± 270	6.12	<0.001
	Control	3220 ± 260	3300 ± 280	2.05	0.054
Sleep Quality (score)	Intervention	55 ± 10	75 ± 8	8.45	<0.001
	Control	56 ± 9	60 ± 10	2.12	0.048

Interpretation :

a. Body Weight: The intervention group showed a significant increase in body weight from 3200 g to 3450 g after receiving infant massage combined with Mozart music ($p < 0.001$). In contrast, the control group showed a smaller increase that was not statistically significant ($p = 0.054$). This suggests that the combination therapy positively influenced infant weight gain.

b. Sleep Quality: Sleep quality scores in the intervention group improved markedly from 55 to 75 ($p < 0.001$), indicating enhanced sleep duration and consolidation. The control group also showed slight improvement (56 → 60), but the effect was weaker ($p = 0.048$). These results suggest that combining massage and classical music can significantly improve sleep patterns in infants.
c. Overall: The analysis confirms that the intervention is more effective than standard care alone, supporting the hypothesis that tactile and auditory stimulation together can enhance both physical growth and sleep behavior in early infancy.

Discussion

The present study revealed that the combination of infant massage with Mozart classical music significantly increased body weight among infants in the intervention group. The mean body weight rose from 3200 g to 3450 g, a statistically significant difference ($p < 0.001$). This indicates that multisensory stimulation can have a measurable impact on neonatal growth, consistent with prior research showing tactile and auditory interventions enhance nutrient absorption and weight gain (Field, 2019).

In contrast, the control group showed a minimal increase in body weight, from 3220 g to 3300 g, which was not statistically significant ($p = 0.054$). This highlights that standard care without additional sensory interventions may be less effective in promoting rapid growth, emphasizing the potential benefits of complementary approaches (Diego et al., 2005).

Infant massage is theorized to stimulate the parasympathetic nervous system, enhancing vagal activity and thereby improving gastrointestinal function and nutrient utilization. This mechanism explains the observed weight gain, as improved digestion and absorption contribute directly to physical growth (Field, 2019; Vickers et al., 2004).

The combination of music therapy, particularly classical music, may also play a role in growth by reducing infant stress levels. Studies have shown that exposure to Mozart can lower cortisol levels and stabilize heart rate, creating an optimal environment for metabolism and growth (Loewy et al., 2013).

Sleep quality, measured by standardized questionnaires and caregiver diaries, improved significantly in the intervention group from a mean score of 55 to 75 ($p < 0.001$). Improved sleep duration and consolidation suggest that the combined intervention promotes neurobehavioral regulation and overall wellbeing (Scher, 2005).

The control group showed a modest increase in sleep quality (56 → 60), which was statistically significant but less pronounced ($p = 0.048$). This indicates that while natural maturation contributes to sleep improvement, additional interventions can accelerate and optimize sleep development (Mindell et al., 2017).

The findings align with previous studies demonstrating that tactile stimulation via infant massage enhances melatonin production, which facilitates longer sleep periods and more restful sleep cycles (Field, 2019). Thus, the intervention likely promotes sleep both physiologically and behaviorally.

From a theoretical perspective, the results support sensory integration theory, which posits that simultaneous stimulation of multiple senses can enhance neural development and functional outcomes. By combining massage and music, infants receive coordinated sensory input that may enhance synaptic plasticity and growth (Ayres, 1972).

Parents' engagement in the massage protocol may also contribute indirectly to improved outcomes. Increased parent-infant bonding during massage sessions can reduce infant distress and crying, indirectly improving weight gain and sleep through a calmer environment (Field, 2010).

The observed improvements in both weight and sleep support the concept of synergistic intervention, suggesting that combining tactile and auditory stimuli produces greater benefits than either intervention alone. This is consistent with limited prior research indicating additive effects of multimodal therapies in neonatal care (Loewy et al., 2013).

The significant weight gain observed in this study may also be explained by enhanced energy efficiency. Music therapy has been shown to reduce energy expenditure by promoting relaxation and reducing unnecessary movement, allowing more calories to be allocated to growth (Diego et al., 2005).

Sleep quality improvements are particularly important because sleep consolidation is linked to multiple aspects of development, including cognitive, emotional, and immune function. Therefore, the intervention may have long-term benefits beyond immediate growth and restfulness (Scher, 2005).

The study demonstrates that hospital-based interventions can be successfully implemented in real-world settings. By integrating simple, low-cost, non-invasive techniques, maternity wards can enhance neonatal outcomes without the need for expensive pharmacological treatments (Field, 2019).

It is important to note that individual differences in response were observed, likely influenced by factors such as baseline health, feeding patterns, and environmental conditions.

This variability underscores the need for personalized approaches when implementing multisensory interventions (Mindell et al., 2017).

The findings also contribute to addressing a research gap in the combination of tactile and auditory stimulation. Previous studies often focused on massage or music alone; this study provides empirical evidence supporting the combined approach (Loewy et al., 2013; Diego et al., 2005).

While promising, the results should be interpreted in light of limitations. The sample size was relatively small (n=30), and the study duration was short (2 weeks). Longer-term studies with larger populations are needed to confirm the sustainability of the effects (Field, 2019).

Nonetheless, this research provides a practical solution for enhancing neonatal outcomes in maternity hospital settings. Training parents or caregivers to administer massage combined with music therapy can be a feasible, culturally adaptable intervention that improves both physical and neurobehavioral outcomes (Ayres, 1972).

In conclusion, the combined intervention of infant massage with Mozart classical music effectively enhanced body weight and sleep quality in infants. The results underscore the importance of multisensory, non-pharmacological approaches in early neonatal care and suggest avenues for future research to explore long-term developmental benefits (Field, 2019; Loewy et al., 2013).

4. Conclusion

The findings of this study indicate that the combination of infant massage and Mozart classical music has a significant positive effect on infant body weight. Infants who received the intervention showed greater weight gain compared to those in the control group, suggesting that multisensory stimulation enhances physiological growth processes through improved digestion, metabolism, and stress regulation. This demonstrates that integrating tactile and auditory interventions can be an effective strategy to promote healthy physical development in early infancy.

In addition to weight gain, the study also found a notable improvement in sleep quality among infants in the intervention group. The enhanced sleep patterns, reflected by longer and more consolidated sleep periods, suggest that massage combined with classical music supports neurobehavioral regulation and overall wellbeing. These results highlight the potential of non-pharmacological, multisensory interventions as practical, feasible, and

beneficial approaches in hospital-based neonatal care to optimize both physical and behavioral outcomes.

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