


The Effectiveness of Infant Massage on Weight Gain of Preterm Infants

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Article Info	ABSTRACT
<p>Article history:</p> <p>Received July 13, 2024 Revised July 13, 2024 Accepted August 09, 2024</p> <hr/> <p>Corresponding Author:</p> <p>Tika Ayu Pratiwi STIKES Flora Medan, Indonesia Email: pratiwiayu1992@gmail.com</p>	<p>A preterm birth is a high-risk event occurring when the gestational age is less than 37 weeks. This can result in adverse outcomes, such as a low birth weight (LBW). The immaturity of the lungs in premature infants increases the likelihood of developing respiratory distress syndrome (RDS). To address this, it is essential to enhance nutritional fulfillment in premature babies with LBW and RDS through targeted intervention. This can be achieved through techniques like massage therapy and nesting installation, which have been shown to stimulate infants' growth and development. The objective of this case study is to determine the effectiveness of combined massage therapy and nesting in increasing the weight of premature babies with LBW accompanied by RDS. The research employed a case study approach. The subjects were premature babies with LBW accompanied by RDS in the perinatology room of the National Referral Hospital in Indonesia. This case study revealed that combined massage and nesting therapy resulted in a 6.1%–7.8% increase in body weight and a stabilization of oxygen saturation from days one to three of therapy. This outcome can be attributed to the fact that massage stimulates the release of gastrointestinal hormones that contribute to weight gain, and that nesting encourages the production of growth hormones resulting from restorative sleep. The integration of these two therapies has been found to significantly enhance body weight and maintain oxygen saturation levels within an optimal range. It is therefore evident that the role of nurses as nursing care providers must be enhanced in order to provide the necessary stimulation interventions for premature babies with LBW accompanied by RDS.</p> <p>Keywords: <i>Massage, preterm, effectiveness</i></p> <p>This article is licensed under a Creative Commons Attribution 4.0 International License.</p> 

1. INTRODUCTION

Preterm birth represents a particularly risky birth type, occurring when the gestational age at which the baby is born is less than 37 weeks. Such births can give rise to a number of adverse effects on neonates, one of which is low birth weight (LBW). In developing countries, preterm birth represents a significant health service challenge, accounting for the majority of LBW cases [1]. In the majority of countries, preterm birth represents a significant public health concern, accounting for the majority of infant mortality and the initial manifestation of a range of complications associated with immaturity. These complications, including low birth weight (LBW), disease, and disability, collectively elevate the risk of adverse outcomes. [2]

LBW, or very low birth weight, is a classification of infants with a birth weight ranging from 1000 to 1499 grams. The immaturity of various organs, particularly the lungs, in premature infants can increase the risk of developing lung disease, such as respiratory distress syndrome (RDS). Lung disease represents a significant global health concern, with immaturity identified as a key contributing factor. [3] Respiratory distress syndrome (RDS) is a breathing disorder in infants caused by immature lungs, which result in a deficiency of surfactant in the lungs. Infants born prematurely who survive are affected by a range of conditions related to the level of organ maturity they experience. This has an impact on each organ, one of which is the respiratory organ. Prematurity occurs in various regions of the world at a rate of 7.5% to 12.5% annually, with the highest prevalence observed in developing

countries (Vogel et al., 2016). Globally, low birth weight (LBW) infants resulting from premature birth occur at a rate of approximately 15.5% (20 million individuals) annually. Developing countries, including Indonesia, contribute the majority of these cases, representing 96.5%. [4] The incidence of low birth weight (LBW) in Indonesia exhibits considerable variation across provinces. The province with the highest incidence is Central Sulawesi (8.9%), while the lowest incidence is observed in Jambi (2.6%).

The incidence of low birth weight (LBW) babies accompanied by respiratory distress syndrome (RDS) in Indonesia in 2013 was 10.2%, and decreased in 2018 to 6.2%. Despite the decrease in cases, LBW accompanied by RDS remains a significant public health concern and must be addressed promptly to prevent long-term complications. Research indicates that this condition has a significant impact on respiratory, cognitive, and neurological functions. Additionally, sensory changes and limited weight gain are commonly observed. During the critical early period, preterm infants with LBW require comprehensive nutritional support until they reach their optimal target weight for their age. Weight gain is an essential factor in mitigating the impact of the condition and preventing potential complications, according to. [5] Preterm infants with low birth weight (LBW) present with a multitude of complex issues that can impede the efficacy of nutritional support in the initial week of life. [6]

Currently, the use of oropharyngeal gastric tubes (OGTs) for access to nutrition is common practice; however, this may not be the most effective approach, as it fails to provide the necessary stimulation to stimulate growth and development. This is a significant issue, as premature infant nutrition is often inadequate due to immaturity of their gastrointestinal function. As a result, they are unable to absorb and intake nutrients effectively, even when provided with them in small quantities, as in the case of OGTs. Therefore, it is crucial to combine nutritional intervention with a stimulation intervention, to ensure the infant's overall development. These interventions are less effective in increasing infant weight because problems related to nutrition in premature infants are also caused by immature gastrointestinal function, which results in inadequate absorption of nutrients and often small intakes. [1] Therefore, in order to fulfill the nutritional needs of the infant, a stimulation intervention is also necessary, as it addresses the infant's developmental needs. This can be achieved through stimulation in the form of massage therapy and nesting installation.

In Asian countries, infant massage therapy has been a traditional practice for centuries. According to Kim and Bang (2018), massage therapy is a supportive therapy that facilitates growth, reduces pain and improves immune function. [6] Furthermore, massage therapy has been found to stimulate vagal activity, which in turn increases the release of digestive hormones in premature infants with low birth weight (LBW). This has the effect of stimulating weight gain in accordance with their target age and reducing the length of stay in the neonatal intensive care unit (NICU). [7] A significant increase in average body weight was observed in LBW infants who received massage therapy compared to those who did not, with a 7% (115.1 grams) increase in the first week and a 23% (400.1 grams) increase in the second week. [1] In this case study, the premature infant was diagnosed with respiratory distress syndrome (RDS), making massage therapy an appropriate intervention to reduce the infant's stress levels, which positively impact breathing. Massage techniques vary across regions and time periods, with the latest methods including tactile stimulation (stroking with moderate pressure) with or without kinesthetic stimulation (passive flexion and extension of the upper and lower extremities). [8] A recent study by Kumar et al., (2013) indicates that massage therapy is more effective when massage oil is used to increase body weight. [9]

2. METHOD

This research used a qualitative study with a case study. A case study is a research design in which a particular case is subjected to intensive scrutiny. [10] The subject of this study was an infant with low birth weight (LBW) complicated by respiratory distress syndrome (RDS) in the perinatology department of a national hospital in Medan. Inclusion criteria were set as follows: neonates with LBW (1000-1499 grams) and gestational age <37 weeks. Exclusion criteria were set as follows: neonates who experienced worsening during the course of the case study. The case study was conducted during the pediatric nursing stage of the Ners Professional Program. Data collection involved direct observation and physical examination of the subjects.

This case study employs a variety of assessment instruments and observation sheets to collect data on neonates. These include instruments for measuring massage time, frequency, and nutrition (type and amount) provided to infants, as well as observation sheets for recording the duration of nesting in prone and quarter prone positions, and daily weight. Nursing care for premature babies with LBW and RDS involves a number of steps, including assessment, determination of nursing diagnoses, intervention planning, implementation, evaluation, and documentation.

Prior to the commencement of the case study, the relevant family members were provided with comprehensive information regarding the implementation of the case study, and their consent to proceed was duly sought and obtained in the form of an informed consent sheet. The data obtained from the aforementioned assessment results was then validated through a process of comparison with the patient's medical records, conducted in collaboration with a qualified nurse. This was followed by the application of the Indonesian Nursing Diagnosis Standards (SDKI) guide, which was used to determine nursing diagnoses based on the assessment data. The data analysis yielded several nursing diagnoses, including a nutritional deficit. The Z-score calculations revealed that the infant had very low weight (BB/U = -4.81), very short length (PB/U = -6.7), and was malnourished (IMT/U = -2.8). The nursing

diagnoses of nutritional deficits serve as a point of reference for the author in determining and implementing nursing interventions, which include massage therapy, nesting installation, and nursing evaluation.

In order to monitor the efficacy of the intervention, premature babies with LBW and RDS are weighed and their vital signs are measured before and after the intervention. The weight of the infant was consistently measured at 5 p.m., approximately 30 minutes after the infant's last feeding. The infant's weight was determined in a state of undress, without diapers or other protective garments, and in a supine position. In the administration of massage therapy to the infant, the selected agent is baby massage oil, which is readily absorbed by the infant's skin and does not induce heat. The massage therapy is conducted in two phases, each lasting five minutes. In the initial phase, the infant is massaged in a comprehensive manner, encompassing the entire body, including the neck and shoulders, the abdomen, the shoulders, the upper back, the thighs, and the legs. Each of these regions is massaged for a duration of two minutes, one minute, one minute, and one minute, respectively. In the second phase, the infant is positioned supine, and the extremities (hands and feet) are flexed and extended. Following the completion of the massage therapy, the infant is placed in a nesting position, combining prone and quarter prone. The highest level of infant comfort, as determined by Çakıcı and Mutlu (2020), was observed in the pronation position, followed by the right lateral, supination, and left lateral positions. [11] The nursing care of premature babies with low birth weight and respiratory distress syndrome was provided in accordance with clinical guidelines and under the supervision of nursing staff. In this study, the researchers applied the principles of ethical research, including respect for the autonomy of research participants, justice, beneficence, nonmaleficence, and confidentiality.



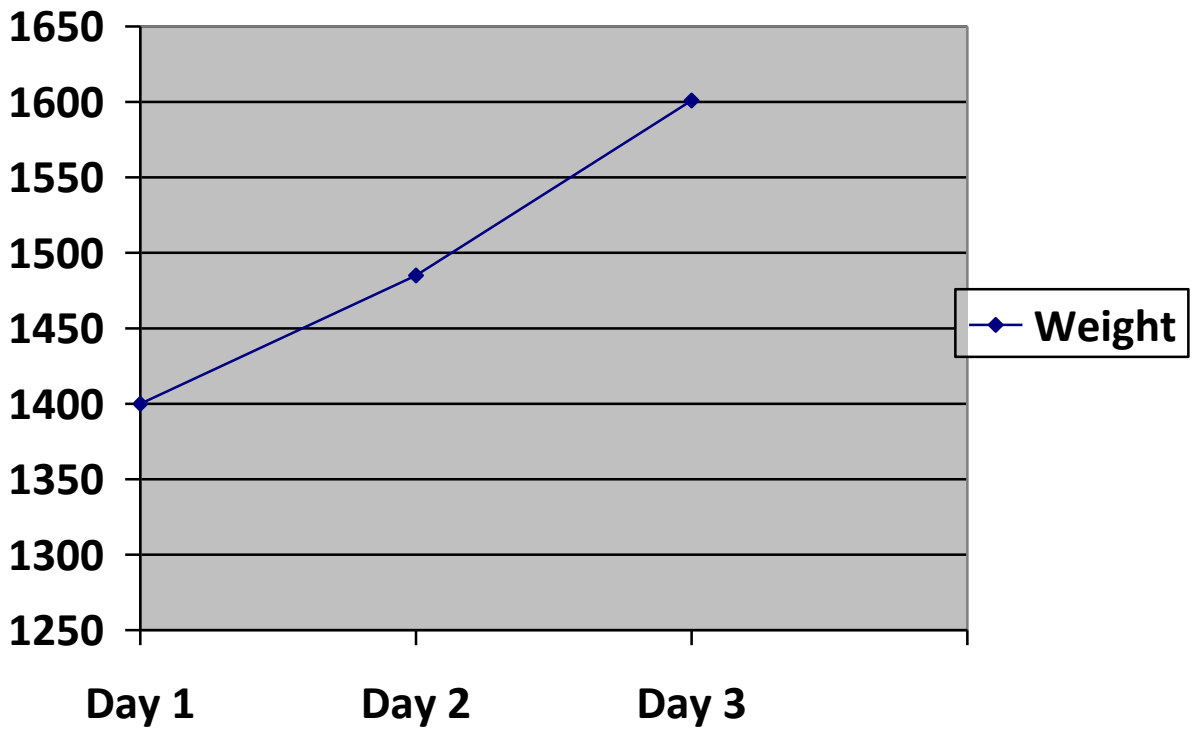
Figure 1. Qualitative Research Method

3. RESULTS AND DISCUSSION

The assessment indicated that the infant was delivered by cesarean section due to fetal distress, premature rupture of the membranes (occurring at 5 hours' gestation), polyhydramnios, and a gestational age of 32-37 weeks, which classified the infant as being at a moderate to late preterm stage. The infant was born at 33 weeks gestational age with a birth weight of 1375 grams, a birth length of 37 cm, an APGAR score of 5/8, and a New Ballard score of 25. At the time of the assessment, the infant was receiving nasal continuous positive airway pressure (NCPAP) with an SpO₂ of 92%, a heart rate of 140 beats per minute, and a respiratory rate of 56 breaths per minute.

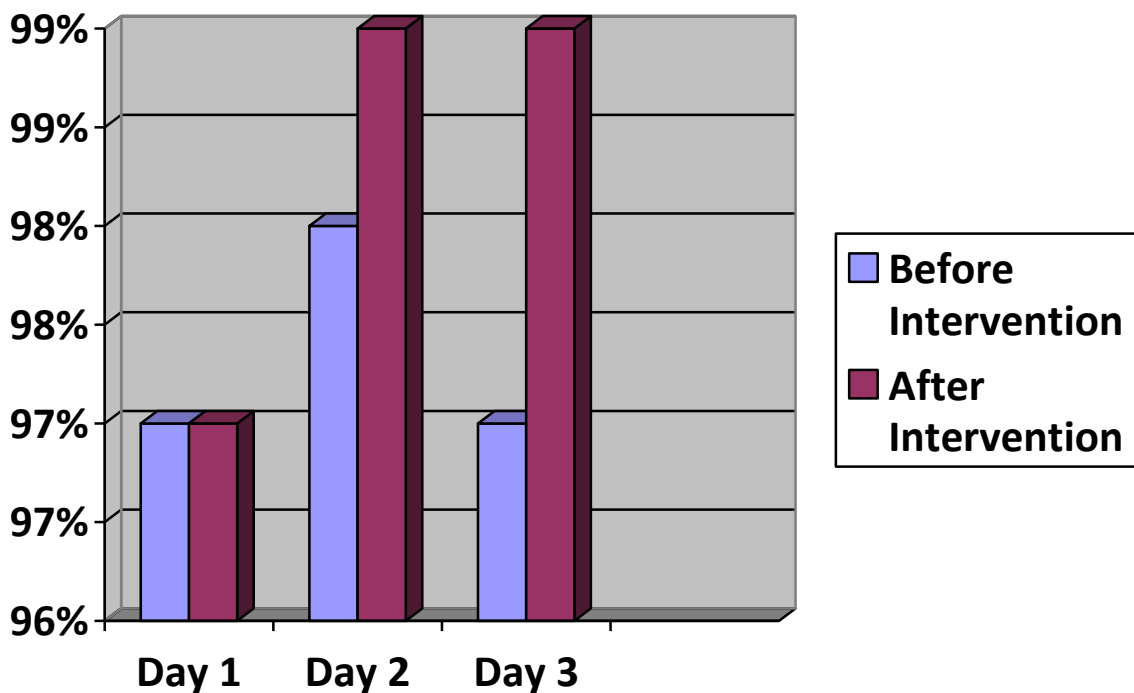
In the context of premature infants with a body weight of 1000-1499 grams, the aforementioned infant is classified as belonging to the LBW category. Additionally, the infant exhibited respiratory distress, which resulted in RDS with a Down Score of 6, rapid, shallow breathing, and retraction of the lower chest and between the ribs on each breath. This condition necessitates the infant's placement in a Perinatology room incubator for continuous care.

The infant was subjected to nursing interventions in the form of massage therapy and nesting, which were designed to stimulate an increase in the infant's weight and maintain the stability of the respiratory system. Positioning was performed during nesting. The objective of this therapy was to reduce pain in infants caused by the installation of invasive equipment, thereby increasing their sense of comfort. It was anticipated that these nursing interventions would result in an increase in body weight in premature infants with LBW and RDS.



Graphic 1. Baby Weight

Graphic 1 illustrates the continuous weight gain of premature infants with LBW and RDS on each day as a result of the combined intervention of massage therapy and nesting. In this case study, the infant exhibited an increase in body weight of 6.1% to 7.8% during days 1 to 3. The infant was administered massage therapy once a day for a duration of 10 minutes (comprising two phases) for three days.



Graphic 2. O2 Saturation

Graph 2 shows the stability of the respiratory system focusing on oxygen saturation. Preterm infants with LBW accompanied by RDS showed that before and after the intervention, oxygen saturation results tended to be stable.

3.1. Discussion

Infants with low birth weight (LBW) are a particularly vulnerable and risky group. This makes LBW babies highly dependent on medical intervention and continuous nursing care. One of the main causes of LBW is premature birth. In order to increase the survival rate of LBW infants, especially those born prematurely, it is essential to provide them with sufficient weight gain, particularly in the preterm birth age group. This is because babies with LBW will have a greater level of adaptation, such as very thin subcutaneous fat tissue, which will make it easier for babies to experience hypothermia and increased oxygen demand. This is because the energy possessed by the body must be sufficient, and babies with LBW at a premature age will have an immune function that is not yet optimal. [12]

A number of factors can influence physical growth in premature infants with LBW, including increased nutritional intake and increased energy needs. [13] Preterm infants with LBW require urgent support to facilitate weight gain through nutritional fulfilment. This support is accompanied by stimulation interventions as an aspect of development, including massage therapy and nesting installation. Massage therapy is a therapeutic intervention administered to infants or neonates with the objective of facilitating growth, reducing pain, and enhancing immune function. [6] The installation of nesting refers to the introduction of fabrics that create a state of comfort and security, akin to the experience of being in the mother's womb, with the aim of maintaining the infant's flexion position. In this case study, a preterm infant with LBW and RDS was subjected to massage therapy using baby massage oil, followed by the installation of nesting for a period of three days. The results of the case study demonstrated that the integration of massage therapy with nesting in premature infants with LBW and RDS led to a more pronounced increase in body weight compared to the gain observed with a single intervention, which ranged from 6.1% to 7.8% between days 1 and 3.

The case study results pertaining to weight gain following massage therapy are consistent with the findings of Zhang and Wang (2019), who observed an average increase in body weight of 7% (115.1 grams) during the first week [1]. Kumar et al. (2013) also demonstrated the efficacy of massage therapy, reporting an increase in body weight of 476.7 grams over a 28-day period (SD = 47.9). [9] Similarly, Saeidi et al. (2015) observed an increase in body weight following massage intervention in premature infants, with an average gain of 105 ± 1.3 grams over seven days. [14] Other studies have indicated that massage therapy in preterm infants has a positive effect on weight gain in resource-limited areas. This is due to the fact that it can increase the concentration of fatty acids in the blood, it was demonstrated that massage therapy can improve thermoregulation and skin barrier function. [15][16][7][17] Furthermore, it has been shown to reduce the risk of serious infections (Salam et al., 2013) and to improve neurodevelopment. [18] A separate study found that massage therapy has a positive effect on increasing body weight in infants, although the difference between those who do and do not receive massage therapy is not significant. [19]

In this case study, the infant was placed in a nesting with fixation after massage therapy, which was conducted using a combination of prone and quarter prone positions. The defense of the baby's position in the nesting can prevent a decrease in body temperature, regulate body temperature, and maintain a sleep-wake cycle, as well as reduce excessive baby movement, thereby saving energy and preventing weight loss. [20] The position maintained during nesting has been demonstrated to improve infant sleep quality by 24%. [21] Nesting has been shown to improve the quality of infant sleep, which plays an important role in the secretion of growth hormone. [22] The results of the case study related to the installation of the nesting are consistent with previous research, which indicates an increase in body weight in infants after using the nesting. Specifically, the study found an increase of 1.5% or up to 28.57 grams over the course of one week. [23] The position maintained during the application of the nesting can enhance the quality of infant sleep by up to 24%. [21] The quality of infant sleep can be improved by the use of the nesting, which plays a pivotal role in regulating the secretion of growth hormones. In this case study, premature infants with LBW and RDS underwent a combined intervention of massage therapy and nesting, which demonstrated a more pronounced increase in body weight. These findings align with those of other similar studies, which have shown that LBW infants can gain 39 grams in 13 days following massage in the nesting, due to the reduction in movement and enhancement of sleep and rest time in infants. The observed increase in body weight in premature infants with LBW accompanied by RDS as a result of massage therapy and nesting interventions suggests that these interventions may facilitate the achievement of the expected target conditions. It is also important to note that the increase in body weight must be accompanied by an increase in the ability to intake nutrients orally, as this is essential for the development of good suction and swallowing power. This, in turn, affects the length of hospital stay ($P = 0.868$). [24]

A meta-analysis of 17 studies demonstrated that massage and nesting interventions can increase daily body weight and reduce length of hospitalization. A shorter length of hospitalization can prevent complications during hospitalization. [25] These findings suggest that the positive influence of these interventions may contribute to an

improvement in the survival of premature infants with LBW accompanied by RDS. It should be noted, however, that this case study has some limitations, including the short duration of therapy implementation.

4. CONCLUSION

The results of this case study indicate that the application of combined massage therapy and nesting interventions can enhance the effectiveness and significance of weight gain in premature infants with LBW and RDS. Nurses must assume a more prominent role in providing stimulation interventions, including massage therapy and nesting installation, for premature infants with LBW and RDS. Further research could be conducted with a longer duration and by monitoring the ability to suck and swallow to ascertain the readiness to remove the OGT and oral intake of nutrients.

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