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EFFECT OF BABY MASSAGE AND KANGAROO MOTHER CARE TO WEIGHT GAIN ON LOW BIRTH WEIGHT (LBW)

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ABSTRAK

Abstract:
Babies with low birth weight (LBW) require more complex treatments. Baby massage and kangaroo method treatment are additional treatments that can be given so that babies experience weight gain. Weight gain is an indicator of growth in babies with LBW. This study aims to determine the effect of infant massage and kangaroo methods on weight gain in LBW babies. Method: Narrative literature review through databases: ScienceDirect, PubMed and Google Scholar using inclusion and exclusion criteria. Results: 20 journals were obtained for analysis. Baby massage carried out by parents for 7 days (3 times a day, for 15 minutes) affected weight gain in low birth weight babies with an average weight gain of 15 grams/day. The kangaroo method, for a minimum of 4-6 hours and carried out directly by the baby's mother, had a more significant effect on weight gain in low birth weight babies with an increase of 6 grams/day. Infant massage interventions and kangaroo methods also had a better effect on weight gain in babies with low birth weight with an average weight gain of 11-23 gr/day. This study concludes that infant massage and kangaroo methods affect weight gain in babies born with LBW.

***Abstrak*:**
Bayi dengan berat badan lahir rendah (BBLR) membutuhkan perawatan yang lebih kompleks. Pijat bayi dan perawatan metode kanguru merupakan perawatan tambahan yang dapat diberikan agar bayi mengalami penambahan berat badan. Penambahan berat badan merupakan indikator pertumbuhan pada bayi dengan BBLR. Penelitian ini bertujuan untuk mengetahui pengaruh metode pijat bayi dan kanguru terhadap penambahan berat badan pada bayi BBLR. Metode: Tinjauan literatur naratif melalui database: Sciencedirect, PubMed dan Google Scholar menggunakan kriteria inklusi dan Eksklusi. Hasil: Didapatkan 20 jurnal untuk dianalisis. Pijat bayi yang dilakukan oleh orang tua selama 7 hari (3 kali sehari, selama 15 menit) memengaruhi kenaikan berat badan pada bayi berat badan lahir rendah dengan kenaikan berat badan rata-rata 15 gram/hari. Metode kanguru minimal 4-6 jam dan dilakukan langsung oleh ibu bayi memiliki efek yang lebih signifikan terhadap penambahan berat badan pada bayi berat badan lahir rendah dengan peningkatan 6 gram/hari. Intervensi pijat bayi dan metode kanguru juga memiliki efek yang lebih baik pada penambahan berat badan pada bayi dengan berat badan lahir rendah dengan kenaikan berat badan rata-rata 11-23 gr/hari. Penelitian ini menyimpulkan bahwa pijat bayi dan metode kanguru memengaruhi penambahan berat badan pada bayi yang lahir dengan BBLR.

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INTRODUCTION

The Infant Mortality Rate (IMR) is the number of babies who die at the age of 0-11 months or before the age of one year in an area and at a certain time per 1000 live births [1]. The number of IMRs describes the level of health problems in the area; if the IMR in an area is high, then the health status in the area is still low [2]. IMR in Indonesia in 2020 is 20.266 deaths (72.0%) reported to have occurred at the age of 0-28 days. The most common cause of neonatal death in Indonesia in 2020 is Low Birth Weight (LBW) [3]. The IMR in Padang in 2020 reached 6.1, with a total of 43 deaths, with 27 cases of infant deaths due to LBW conditions [4].

Low Birth Weight is a baby's weight at birth below 2500 grams [3]. LBW are at a higher risk of dying [1]. In addition, babies with LBW who can survive have psychological and neurological impacts [5]. Indications of LBW are a major risk factor for incidents of stunting. Children with a history of LBW are 5.87 times more at risk of experiencing stunting [2]. The number of neonatal deaths in Indonesia that occurred at the age of 0-28 days and which were reported amounted to 20,266 cases, with 35.2% of them with LBW conditions consisting of 108 baby boys and 161 baby girls (Arsyi & Besral, 2021).

Newborn mortality cannot be reduced significantly without support for efforts to reduce maternal mortality, improve maternal health and management of essential infant health [7]. LBW babies require more complex care than babies born normally [8]. One of the stimulations that can be given to LBW is massage therapy. Massage therapy is a non-invasive procedure that can increase the baby's weight [9]. LBWs who are given baby massage intervention experience an increase in weight after being given baby massage. This is because, during massage, there is an increase in the work of the vagus nerve tone and an increase in the enzymes gastrin, insulin, and Insulin-Like Growth Factor 1 (IGF-I) so that gastric motility increases so that nutrient absorption becomes better and can increase body weight. LBW who get massage therapy is accompanied by a balanced nutritional intake [10].

Kangaroo Mother Care (KMC) is caring for infants by always holding the baby in the arms of the mother or another person with direct skin contact between the baby and the mother by always holding him [11]. KMC is an alternative to incubators because it can improve the psychological and emotional experience of the baby, facilitate breastfeeding, provide protection against infection and affection [10]. The increase in body weight that occurs after receiving kangaroo method treatment is also influenced by the ability to suck milk in infants. When using the kangaroo method, the mother's breastfeeding frequency will also become more regular so that the baby's nutritional and fluid needs can be met [10]. Treatment with the skin-to-skin method helps the baby to find the mother's nipple and suck it so that it can encourage successful breastfeeding [11].

RESEARCH METHOD

This writing with a Narrative literature review was conducted in October 2021-February 2023. Data was collected through digital libraries, namely ScienceDirect, PubMed, and GoogleScholar using inclusion and exclusion criteria. The inclusion criteria for journal searches are full-text journals, primary journals, Scopus-indexed English journals, and publications in 2017-2022 with various journal research designs that discuss the effect of infant massage and the kangaroo method on weight gain in infants with low birth weight (LBW). Exclusion criteria for journal searches are journals whose contents only contain text and not full text, secondary or tertiary journals, and journals published under 2017.

RESULT AND DISSCUSION

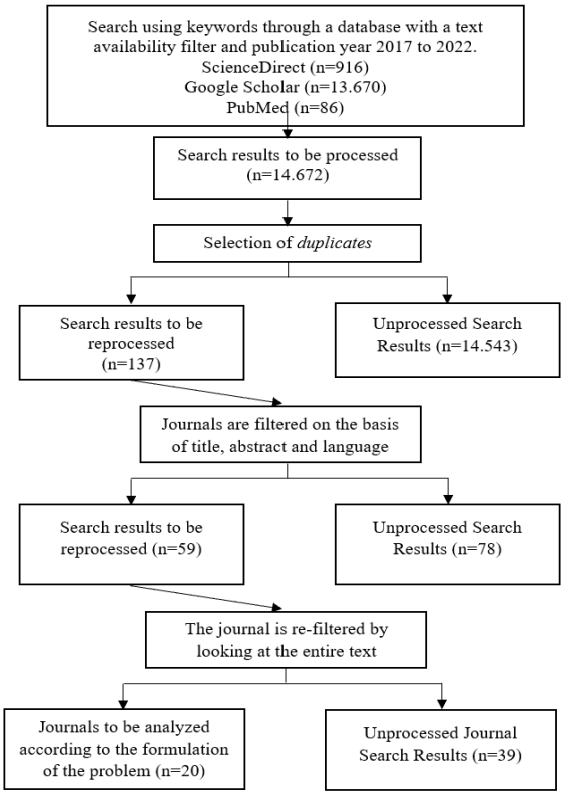

Figure 1. Stages Narrative Review

Journal searches were carried out through PubMed, ScienceDirect, and Google Scholar. They were then selected based on inclusion and exclusion criteria, journal duplication, title, language, and topic relevance, resulting in 20 journals for analysis. Selected articles will be read in full (full-text). Articles relevant to the inclusion criteria will be used for further analysis. In the Science Direct database, six articles were found; in PubMed, seven were found; and in Google Scholar, seven were found. Relevant articles based on inclusion criteria found as many as 20 articles identified through a value indexing system on the website www.scimagojr.com. There were nine articles on the effect of baby massage on weight gain in low birth weight (LBW), eight articles on the effect of the kangaroo method on increasing weight in low birth weight (LBW), and three articles on the effect of baby massage. And the kangaroo method for increasing body weight in low birth weight (LBW).

Effect of Baby Massage on Weight Gain in Low Birth Weight (LBW)

In a study by Anjos et al., the massage group found an average variation in weight gain from the first day between 25 and 32 grams [11]. Infant massage was carried out daily for five consecutive days for 15 minutes. In this study, three stages were carried out including two tactile stimulation and one kinesthetic stimulation. The first stage is carried out with the baby in a prone position. Tactile stimulation (massage) is carried out with moderate pressure in a sequence from the anterior fontanel to the neck, back to the fontanel, from neck to shoulder, back to neck, from neck to sacral area, back to neck area, from thigh to leg back to thigh (on each leg); from shoulder to hand back to shoulder (on each arm). In the second stage, kinetic stimulation is carried out with the baby positioned in a supine position. In the following order, a) flexion/extension of the arms, b) flexion/extension of the foot, c) flexion and extension of the limbs performed simultaneously. For each movement performed, the duration is given the same, namely for 5 seconds of flexion and 5 seconds of extension and repetition of each sequence six times. In the third stage, movements from the first stage are carried out. Massage is given without using oil or lotion [11].

Another study found that the massage group had a much higher weight gain of 100 grams than the control group, which was 45 grams. 52 Massage was carried out in this study, similar to that of Francine et al. (2021) but added palm and plantar massage, which is done using baby oil. The study also obtained the same results with 54 infants in the infant massage group (dos Anjos et al., 2022). Massage is given while the baby is in the hospital. After the baby massage, the massage group averaged 895.7 (SD=547.9) grams of weight gain. In the control group, the average weight at discharge was 541.8 grams (SD 536.2). From the above results, it was found that

massage therapy in LBW babies can increase body weight. Baby massage is carried out by the baby's parents, who have previously been given training [12].

In Zhangi and Wang's study (2019), it was found that the average weight gain in the massage group was 515.2 grams after 14 days of intervention, while in the control group, it was 177.7 grams. In addition to an increase in body weight, there is also an increase in the baby's height and head circumference [13]. The results of the study by Taheri et al. (2018) obtained the same results, namely, babies who received massage with sun oil experienced an increase in body weight of 14.90 ± 10.78 per day, while those in the control group experienced a decrease in body weight of 19.60 ± 44.03. The weight loss in the control group was due to different interventions (incubation, absence of family, and pressure in the NICU environment) and physiological weight loss in the first two weeks of life [14]. This is in line with another study. In the control group, the cumulative weight increased by 25 grams; in the massage group, it was 77.5 grams with five days of intervention. Massages were given three times a day, with the first massage being done 1 hour after meals at 2-hour intervals (1 p.m., 3 p.m., and 5 p.m.) [15].

Research by Aziznejadroshan et al. (2020) compared the effects of baby massage with coconut oil and sunflower oil on the growth of premature babies. The results compared the mean weight change at the end of the first week between the coconut oil massage group of 6.81 ± 3.04 grams and the sunflower oil massage group of 6.35 ± 2.69 grams. The average weight gain in the oil-free massage group was 2.95 ± 2.65 grams, while in the control group, it was 3.25 ± 4.38 grams [16]. Research by Rad et al. (2022) showed a significant increase in body weight in the massage group compared to the control group for four days of massage. The massage group experienced a weight gain of 64 and 44 grams in the control group [17].

In the 2018 Taheri et al. study using sunflower oil and Aziznejadroshan et al. 2019 research with one cc of sunflower oil and coconut oil to reduce friction between the massager's fingers and the baby's skin and warm the hands. The use of oils/lotions can improve skin barrier function and thermoregulation and reduce trans-epidermal water loss and neonatal infections [14], [16], [17].

Several studies have shown that trained health workers carry out baby massage for LBW babies. This aims to ensure that the interventions provided are safe and optimal. Whereas in the 2019 Alvarez et al. study, Zhangi and Wang (2019) baby massage was carried out by the baby's mother herself after receiving previous training and being supervised by health workers. Oral administration experienced better weight gain than infants who only received standard care [13], [18].

Baby massage on LBW affects increasing body weight as an additional intervention. Weight gain in LBW babies is a reference for the baby's health. Fulfilling nutrition and nutritional needs by giving breast milk and/or formula milk, and giving dextrose through IV is an effort that can be done to increase body weight but in a long time. Fulfilling nutritional needs followed by infant massage interventions effectively increases baby weight. Baby massage has many benefits, including weight gain and body length, increased bone density, better quality and quantity of sleep, good elimination abilities, and reduced stress in infants, which optimizes glucose regulation and lowers serum glucocorticoid levels [19].

Baby massage can improve the performance of the vagus nerve and intestinal peristalsis and the body's metabolism so that body weight can increase. Good performance of the vagus nerve will stimulate the production of digestive enzymes, gastrin, and insulin to maximize food absorption. Baby massage intervention will maintain nutritional adequacy by increasing the absorption of

macronutrients and micronutrients by stabilizing basal metabolism, inducing insulin and adrenaline, and preventing cortisol secretion. Tactile and kinesthetic stimulation given to infants can increase serotonin secretion in the hypothalamus, leading to higher growth hormone secretion [10].

Difficulty in breastfeeding is a major concern for LBW babies, because immature oromotor skills and incoordination of sucking and swallowing are the causes of difficulty in breastfeeding and LBW babies. Giving multi stimulation can increase the frequency and volume of intake in infants. Intraoral stimulation can increase the movement of the tongue and the baby's suction ability [18]. Thus, baby massage can increase weight in babies with LBW indications.

Before the massage, it is ensured that the baby has normal vital signs, is healthy, and has no congenital abnormalities through a physical examination. During massage therapy, the baby's reactions and behavior are observed for signs of distress (yawning, spreading his fingers, crying). Vital parameters, including axillary temperature, preductal oxygen saturation, heart rate, non-invasive blood pressure, and respiratory rate, were measured 15 minutes before, after the first 15 minutes (immediately after therapy), and 15 minutes after the massage procedure [14].

Based on the analysis results, it was found that babies who received massage would gain weight significantly after five days of giving massage therapy. An increase in nutritional intake also accompanies this. The average frequency of baby massages to increase body weight in LBW babies is three times a day for seven days with a duration of 15 minutes. Massage therapy given directly by the baby's parents has a better effect on the baby's weight gain because LBW babies in the NICU receive various treatments that are painful and increase stress so that if the massage is done directly by the baby's parents, the baby feels more comfortable and relaxed and can increase the bonding attachment between the baby and the mother. The use of oil/lotion can induce transdermal absorption of fatty acids and prevent water loss [13].

Effect of Kangaroo Mother Care on Weight Gain in Low Birth Weight (LBW)

Based on research results, Muliani and Lisnawati (2018) found a significant difference in average weight gain between KMC duration <4 hours, namely 1.99 ± 180.45 grams and KMC duration ≥4 hours, the average weight gain was 1.54 ± 107.16 grams with p-value 0.187. This means that statistically, applying KMC has significant potential to increase body weight in LBW. In addition, the presence of kangaroo method care will shorten the length of stay in the hospital compared to Conventional Method Care (CMC). This kangaroo method is carried out directly by the baby's mother [20]. This is in line with the study of Rehman et al. (2020), where the intervention group that received kangaroo treatment experienced a greater increase in body weight with an average weight gain of 10.22 ± 1.65 grams/kg/day compared to the control group, namely 7.87 ± 1.71 gram/kg/day with p=0.0001. In this study, the intermittent kangaroo method was applied. This method is carried out for 1 hour every 4 hours for seven days. Skin-to-skin contact and feeding are ensured under clothing. The mother and baby only wear diapers and hats. Intermittent KMC is performed in a separate area within the NICU. All babies are given exclusive breastfeeding [21].

The same results were also obtained in the study of Ocampo et al. (2021); the KMC group had a higher average daily weight gain of 26.95 grams ± 12.83 compared to the control group, 19.83 grams ± 6.64 with a p-value of 0.0102. Research by Ocampo et al. (2021) applies the kangaroo method with an accumulation of at least 6 hours per day. When the baby is not at the KMC, the baby is placed in the

bassinet under a light bulb, properly clothed and covered [22].

Kangaroo method care is carried out directly by the baby's mother. Babies who get this intervention are stable babies (not dependent on oxygen, infusion, or both); in the last 24 hours, the baby's temperature is within normal limits (36.5 - 37.5C), normal heart rate (120-160 bpm), no apnea, no sepsis or signs of sepsis present. The results of Nurhayati et al.'s research (2019) found that the average baby's weight was 1724 grams, and after being given kangaroo treatment, the baby's weight increased to 1844.3 grams [23]. This is in line with the results of the study of Mehrpisheh et al. (2022), the group of babies who received kangaroo method treatment had a higher body weight of 2164 ± 481.1 compared to babies in the control group, namely 1965.2 ± 372 grams. The kangaroo method treatment in the study of Mehrpisheh et al. (2022) was carried out for a week for 45 minutes [24].

In a study by Logronio et al. (2021) concerning the effect of intermittent continuous kangaroo treatment on weight gain, it was found that in the continuous KMC group, the average weight gain was 70.48 grams, and in the intermittent KMC group, 91.13 grams with a p-value = 0.509. This shows that the results obtained are not statistically different from those of KMC Intermittent [25]. Research by Shattnawi and Nahla (2019) obtained the same results wherein the babies who received skin-to-skin contact treatment experienced higher weight gain than babies with standard care, namely 53.7 grams with 32.6 grams after five days. This skin-to-skin contact (SSC) is carried out immediately after the baby enters the NICU and the baby is stabilized (an average age of 12 hours after birth). While performing SSC, the infant is linked to a bedside cardio-respiratory monitor to assess for apnea. Mothers are encouraged to talk to their babies during SSC. This SSC is carried out for 60-120 minutes daily and depends on the baby's tolerance [26]. According to research by Casper et al. (2018), early, regular, and prolonged skin-to-skin contact positively impacts the health of premature babies. The group of infants who received SSC starting in the first week of life experienced a greater increase in body weight (23.03 grams) compared to infants who received SSC after the first week of life (20.18 grams) [27].

From the analysis of the article, it can be concluded that the kangaroo method can increase weight in babies with LBW indications because it can allow babies to spend longer time with their mothers. This weight gain can be caused by the interaction of several physiological mechanisms resulting from releasing oxytocin in mothers and newborns. This release of oxytocin positively impacts the breastfeeding process, whereby milk production will be better, breastfeeding time will be longer, and the amount of milk the baby will receive will increase. Weight gain can also be affected by the stability of the baby's body temperature. KMC can provide warmth to the baby. This can make the baby sleep peacefully and will increase the sucking réflex [23].

Applying the kangaroo method to babies born at 28-32 weeks of gestation, with a minimum duration of 4-6 hours daily, shows a significant increase in body weight. Skin-to-skin contact between mother and baby can increase the baby's weight by an average of 30 grams/day. Kangaroo method care performed by the baby's mother showed better results on weight gain. This is because being close to the mother makes it easier to meet the baby's nutritional needs than the kangaroo method used by fathers and other families.

Effect of Baby Massage and Kangaroo Mother Care on Weight Gain in Low Birth Weight (LBW)

The results of the study by Fermin et al (2021) stated that the baby massage and kangaroo method intervention group experienced an average weight gain of 161.52 ± 99.59 grams, while the kangaroo

method intervention group only experienced an average weight gain of 95.20 ±95.35 gram. In the study of Acosta et al (2018), daily weight gain was significantly higher in the kinesthetic stimulation group in the kangaroo position with an addition on the fifth day of 11.0 g/kg/day in the kinesthetic stimulation group in the incubator 2.1 g/kg/day [28], [29].

Research by Goykar and Namrata (2020), providing treatment with physiotherapy methods can increase body weight in LBW. Techniques in physiotherapy include infant massage, passive movement, proprioceptive stimulation, oral stimulation, and kangaroo care methods. This physiotherapy is carried out twice a day, lasting 25-30 minutes for seven days. After that, the weight and frequency of breastfeeding should be checked to see the progress. Proprioceptive stimulation with joint compression and swaddling can calm the baby and improve the baby's neurobehavioral state. Passive movement has also been effective in increasing body weight by increasing nutrition and bone mineralization with movement [30].

Optimal care for LBW babies can be achieved with a balance of simple interventions such as Kangaroo Mother Care (KMC) and massage therapy to ensure safety and comfort and increase newborn survival. These combined interventions will lead to faster weight gain. This weight gain could be associated with less stress from massage given to babies in the kangaroo position, as the mother's breast is the best antistress for premature babies [29]. Baby massage combined with the kangaroo method can increase baby's weight better because both are equally effective in increasing body weight. Providing massage therapy and kangaroo method care can stimulate the central nervous system, which will trigger various chain reactions, such as increased production of the hormone serotonin (a hormone that affects digestion, appetite, and sleep) and less cortisol and norepinephrine (as a response to stress). This is why combining baby massage with the kangaroo method has a better effect on increasing body weight in babies with low birth weight [29], [31].

CONCLUSION

Baby massage performed by parents for seven days with a frequency of 3 times a day and 15 minutes increases body weight in low birth weight babies with an average weight gain of 15 grams/day. Kangaroo mother care carried out for at least 4-6 hours and carried out directly by the baby's mother, significantly increases body weight in low birth weight babies, with an average increase in body weight every day of 30 grams. Baby massage interventions and the kangaroo method also found a better effect on increasing body weight in babies with low birth weight with an average weight gain of 11-23 g/day.

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