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Effects of Breast Milk Fortification on Weight Gain in Low Birth Weight Infant Patients: Case Report

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ABSTRACT

The WHO defines Low Birth Weight Infants (LBW) as babies born weighing less than 2500 grams regardless of gestational age. Low birth weight babies have a higher risk of developing complications and health problems. Therefore, interventions to improve babies' weight should be carried out. To assess the effect of providing breast milk fortification on babies' weight in neonatal patients with LBW. This study uses a case report by giving breast milk fortification to patients with LBW hospitalized in the PICU-NICU room at Temanggung Regency Hospital. The results of this case study showed that after being given breast milk fortification for six days. The diet dosage is as follows: Day 1: breast milk 24 cc and fortification 0.125 grams; Day 2: 25 cc breast milk and 0.25 grams fortification; Day 3: 27 cc breast milk and 0.25 grams fortification; Day 4 & 5: 28 cc breast milk and 0.25 grams fortification, Day 6: 30 cc breast milk and 0.25 grams fortification. The patient's weight increased significantly from 1259 grams to 1390 grams. A combination of breast milk and breast milk fortification can increase body weight in neonatal patients with LBW.

Keywords: body weight, breast milk fortification, LBW

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BACKGROUND

Low birth weight infants (LBW) are one of the most serious challenges in maternal and child health. The World Health Organization (WHO) defines LBW as a baby born weighing <2,500 grams regardless of gestational age (Devaguru et al., 2023). Data from WHO found that the prevalence of LBW is estimated to reach 15-20% of all births in the world, and from these results, as many as > 20 million babies experience LBW. Almost 95% of these cases occur in low- to middle-income countries or developing countries, with 6% in East Asia and the Pacific, 13% in Sub-Saharan Africa, and 28% in South Asia. Meanwhile, Indonesia is still among the high numbers related to LBW rates in Southeast Asia (Gemilastari et al., 2024). This refers to the results of the Indonesian Nutrition Status Survey (SSGI) 2022, which found that the prevalence of LBW in Indonesia was 6%. LBW is often found in babies born prematurely; WHO and UNICEF estimate that 10% of premature babies are born with low birth weight (Kemkes, 2023).

Maternal health during pregnancy dramatically affects the growth of the baby in the womb. Lack of nutrition, limited access to medical care, and an unhealthy lifestyle can lead to LBW. Therefore, pregnant women need to get optimal health care and maintain a healthy lifestyle to prevent low birth weight problems in babies who are born (Popi Sundani, 2020). Babies born with low birth weight can experience several health problems, including asphyxia, respiratory problems, heart problems, yellow babies, anemia, hypothermia, nutritional problems, risk of infection, and problems with the nervous system (Citra et al., 2020). Thus, to prevent complications from LBW, appropriate treatment is needed.

Some treatments or interventions that can be done to support weight gain in infants with LBW include breastfeeding, a combination of fortification, kangaroo method care, infant massage, music therapy, and orotherapy (Ratriyana et al., 2023). One of the accessible interventions that can be done for the baby's mother is breastfeeding. Breast milk is breast milk given as early as possible after the delivery process to the baby without giving additional food or drinks, such as water, until the baby is six months old (Safitri & Puspitasari, 2018). Breast milk given to babies up to six months of age is exclusive breast milk, then continued until the age of 2 years to be given additional food (complementary foods) to support their growth (Amalia et al., 2023). Infants with LBW need special treatment to achieve the expected weight because infants with a body weight < 2500 grams can experience a 20 times higher risk of death when compared to infants who have average weight (Djude & Hodijah, 2022). However, there are several conditions in which breast milk is not given directly to infants, including the separation of infants from mothers due to hospitalization and mothers who have medical indications. So, babies are given breast milk substitutes (PASI) or breast milk fortification, which is an effort to add micronutrients to meet the needs of babies (Ratriyana et al., 2023). In addition, in infants who have problems such as premature babies, on average, the ability to suck breast milk directly to the mother is still lacking, so the fulfillment of their nutrition can be assisted by giving it through the Orogastric Tube (OGT) (Ru et al., 2020).

Breast milk fortification is an effort to add micronutrients to breast milk. This process can be done in two ways, namely, standard fortification or individualized fortification. In the first method, the fortifier is added to breast milk at a predetermined concentration without considering each individual's nutritional needs. Although simple, this technique only sometimes provides the desired growth results. Individualized fortification, a newer concept, is recommended in the second method. The implementation of this second fortification is further divided into two, namely, adjustable fortification and tailored/targeted fortification. The tailored fortification method is a suitable method, but it is expensive, and the implementation procedure is not easy to do. Meanwhile, tailored fortification is based on

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analyzing the mother's breast milk. Meanwhile, adjustable fortification provides fortifiers based on each baby's metabolic response (Handayani et al., 2020). In the case of LBW babies, it is hoped that breastfeeding and breast milk fortification can add calorie nutrition to the baby so that the baby's weight can increase. Based on this background, this case report aims to see the effect of breast milk fortification on increasing body weight in neonate patients with low birth weight babies (LBW).

METHODS

This research method is a case study (case report); the sample in this case report is neonates with low birth weight (LBW). The instruments in this study used scales, tools, and materials in the form of fortified and breast milk. The provision of breast milk fortification in this study was carried out for six consecutive days, starting from Monday, April 29, 2024, to May 4, 2024, in the PICU-NICU Room of Temanggung District Hospital. Breast milk fortification was implemented by providing infant nutrition with fortification combined with breast milk every 3 hours per day. The intervention was carried out under the supervision of the room nurse and seen by the patient's family; then, the researcher analyzed the nutritional needs in breast milk fortification needed per day and evaluated the patient's weight gain for 6x24 hours.

Table 1. Breast milk fortification as needed

Day	Breast Milk(ml) + Fortification(gram)
1	24 + 0,125
2	25 + 0,25
3	27 + 0,25
4	28 + 0,25
5	28 + 0,25
6	30 + 0,25

RESULTS

This study was conducted on a 20-day-old male neonate patient with a Low Birth Weight Infant (LBW) medical diagnosis. The patient was born prematurely at the gestational age of 29 1/7 weeks spontaneously on April 9, 2024, at Temanggung Regency Hospital. After being born, the patient was immediately admitted to the PICU-NICU room for further treatment. Anthropometry was obtained at birth: Head Circumference 29 cm, Upper Arm Circumference 8 cm, Chest Circumference 23 cm, Abdominal Circumference 22 cm, Body Length 39 cm. At the time of assessment, the patient's consciousness was found to be Compos Mentis (CM), active crying, active movement, warm palpable skin, attached Nasal Cannula (1 lpm), attached Orogastric Tube (OGT), body weight 1259 grams, Pulse 132x / min, Temperature 36.5℃, SpO2: 93-96%. Based on the results of the assessment, the researcher formulated the first nursing diagnosis as Ineffective Breathing Patterns (D.0005), the outcome is Breathing Patterns (L.01004), and the nursing intervention is Airway Management (I.01011). The second diagnosis is the Risk of Attachment Disorders (D.0127), the outcome is Attachment (L. 13122), and the intervention is Attachment Promotion (I. 10342). While the third diagnosis is the Risk of Nutritional Deficit (D.0032), the outcome is Infant Nutrition Status (L. 03031), and the intervention is Nutritional Management (I.03119) and Infant Nutrition Education (I. 12397).

Based on the results of the study conducted for six consecutive days, the weight gain per day is as follows:

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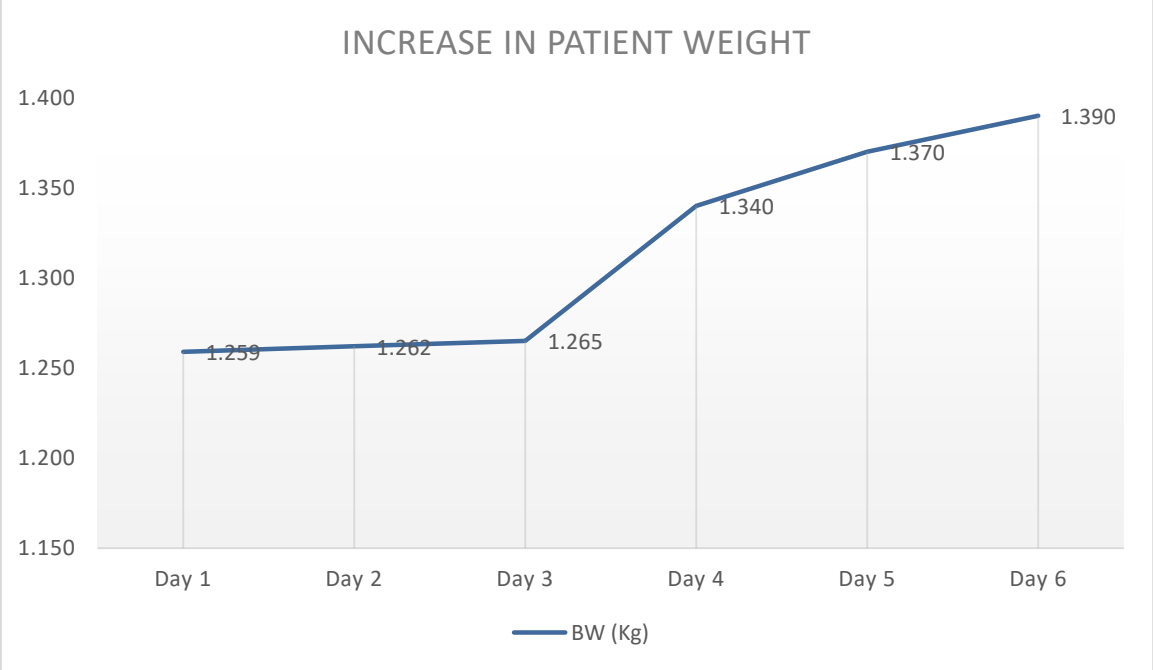

Grafik 1. Increase in Patient Weight

After six days of monitoring, breast milk fortification given through Orogastric Tube (OGT) can increase body weight in patients with LBW. This is obtained from graph 1, which shows the body weight on the first day of 1.259 kg, on the second day 1.262 kg, on the third day 1.265, on the fourth day 1.340 kg, on the fifth day 1.370 kg, and the last day 1.390 kg. So, within six days, there was an increase in body weight of 131 grams. These results show an increase in body weight after being given breast milk fortification, as evidenced by the increase in body weight, which continues to increase daily.

DISCUSSION

The six-day monitoring results showed that breast milk fortification given through the Orogastric Tube (OGT) can increase body weight in patients with LBW. This was obtained with the results of body weight on the first day 1.259 kg, on the second day 1.262 kg, on the third day 1.265, on the fourth day 1.340 kg, on the fifth day 1.370 kg, and the last day 1.390 kg. Within six days, there was an increase in body weight of 131 grams. These results show an increase in body weight after breast milk fortification, as evidenced by the increase in weight gain, which continues to increase daily. These results indicate that breast milk fortification has a good impact on increasing body weight in LBW infants. Weight gain in LBW indicates improved health status in survival, growth, physical development, and mental development. The best anthropometric indicator to determine low birth weight babies' nutritional and health status is to monitor body weight (Nugraheni et al., 2022). This is also evidenced by other studies, namely, the effect on underweight infants aged 0-6 months, which is also obtained by the micronutrient content of breast milk given by the mother (Pramudita & Wieminaty, 2023).

Research conducted in 2024 by Loebis and friends explained that babies who experience LBW have a risk of developing a disease and even death. This is due to the immaturity of the organs and body conditions in infants. Some characteristics of LBW babies include thin and transparent skin, irregular breathing, little fat, weak movement, and reflexes to suck and swallow are not perfect (Loebis et al., 2024). From the characteristics that have been mentioned, complications can arise, such as unstable body temperature, respiratory

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disorders, digestive and nutritional disorders, seizures, and neonate infection/sepsis (Layuk, 2021). So, the handling of babies with LBW needs to be considered before the baby is born, during the delivery process, until after birth to prevent existing complications. Handling includes preventing under-term births, preparing officers equipped with respiratory support equipment, maintaining a warm environment, preparing oxygenation, reducing the occurrence of infection by washing hands, and breastfeeding as early as possible. Breastfeeding, which is carried out since the baby is born, is one of the easy treatments to do, especially in supporting weight in babies with LBW; it can also create an affectionate relationship between mother and child, accelerate the mother's postpartum recovery process, and can save money on buying baby milk (Saraha, 2020). The main benefits provided by breast milk include being the best source of nutrition, containing lots of protein, carbohydrates, and fats to support the growth and development of babies, as well as supplementation of vitamins and minerals needed to overcome deficiencies that arise (Management of Low Birth Weight Infants (LBW) - Dr. Sardjito Hospital, 2019).

The calorie content in breast milk fortification is higher than in breast milk. Meanwhile, the calorie requirement in LBW is 100-160 Kcal/KgBW/day. A 2021 study investigated the impact of fortification on the growth and metabolism of preterm infants by adjusting breast milk macronutrients. The control group received standard fortification, and the intervention group received standard target fortification by adding modular protein, fat, and carbohydrate. The intervention group infants had higher macronutrient intake and weight gain. Infants in the intervention group from mothers with below-average breastmilk protein content showed more significant effects on weight, length, head circumference, fat, and less food intolerance (Rochow et al., 2021).

By the 2020 research, which is related to the weight gain of LBW who get a combination of breastfeeding and fortification, the average BW results of respondents before getting a combination of breast milk and fortification were obtained at 1885.4 grams. After being given a combination of breast milk and fortification for 14 days of treatment, the average weight of the respondents was 2023.5 grams. These results show a difference in the average value between birth weight and weight after receiving a combination of breast milk and fortification for 14 days of treatment, which is 138.1 grams. It can be concluded that there is a significant increase in weight before and after 14 days of treatment in LBW babies who get a combination of breast milk and fortification (Fitri, 2020).

In another study, in a Special Care Nursery (SCN), most infants were found to be of low and moderate (32 to 34 weeks gestation) to late (34 to 36 weeks gestation) birth weight. Previously, we started fortification of expressed breastmilk or preterm formula with the achievement of the full enteral target of 160 mL/kg/day before switching to the previous fortification protocol/preterm formula of 80 mL/kg/day. We reviewed the available evidence on appropriate protein intake levels. We showed that daily protein intake above 3 g/kg, which is a critical level to maintain fetal growth rate, can be provided immediately after birth through breast milk fortification (resulting in 1 g protein per 100 mL of milk) if started with an enteral volume of 80 mL/kg/day (Ma & Fan, 2020).

CONCLUSION

After six days of monitoring, giving breast milk fortification to patients can increase body weight in patients with LBW. The weight gain obtained from the first day to the second day was 3 grams, the second day to the third day was 3 grams, the third day to the fourth day was 75 grams, the fourth day to the fifth day was 30 grams, and the fifth day to the sixth day increased by 20 grams. So, within six days, there was an increase in body weight of 131 grams. These results show increased body weight after breast milk fortification, as evidenced by increased weight gain. The results showed an increase in body weight after being given

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breast milk fortification, as evidenced by the increase in body weight, which continues to increase daily.

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