Effectiveness of Oral Motor Stimulation on Increasing the Weight of Low Birth Weight Infants

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Abstract

Background: Low Birth Weight (LBW) Infants often experiences feeding difficulties due to oromotor function immaturity, which directly inhibits weight gain and prolongs hospitalization. Oral motor stimulation is a promising non-pharmacological intervention to address this issue, but quantitative evidence regarding its impact in the context of local care still needs to be strengthened. **Objective**: This study aims to analyze the effect of oral motor stimulation intervention on weight gain in LBW infants. **Method**: This study used a pre-experimental design with a one-group pre-post test design. A total of 18 LBW infants who met the inclusion criteria in the Perinatology Room of R. Ali Manshur Hospital, Tuban, received oral motor stimulation intervention for 15 minutes every day for 7 consecutive days. Weight data before and after intervention were analyzed using the Paired Samples t-Test after meeting the assumption of normality through the Shapiro-Wilk test. **Results**: The results showed an increase in average body weight from 2122.22 grams (SD=181.68) to 2608.33 grams (SD=88.43). There was a very significant difference in body weight with an average increase of 486.11 grams; t = -13.736; p <0.001). **Conclusion**: Oral motor stimulation intervention was significantly effective in increasing weight gain in LBW infants. This intervention can be an important component of nursing care to optimize growth outcomes and support readiness to go home in this vulnerable population.

Keyword: Oral Motor Stimulation, Weight Gain, Low Birth Weight Infants, Neonatal Health.

INTRODUCTION

In Indonesia, LBW is one of the main causes of neonatal mortality, contributing 35.3% of total deaths in 2019 (Kemenkes, 2019). This trend is also reflected at the local level; in East Java, the prevalence of LBW increased from 3.7% in 2020 to 4% in 2022. Specifically at the research location, R. Ali Manshur Regional Hospital, data showed an increase in the prevalence of LBW from 9.01% in 2022 to 12.8% in 2023. These data confirm that there is a real and urgent problem that needs to be addressed.

Achieving optimal birth weight is one of the most important clinical outcomes in neonatal care, especially in the low birth weight (LBW) population. LBW infants often face significant challenges in transitioning to independent oral feeding due to physiological immaturity, especially coordination

between sucking, swallowing, and breathing reflexes (Nath, Mukherjee and Guha, 2020). Various risk factors such as low gestational age, birth weight, and low Apgar scores have been shown to be associated with increased incidence of feeding disorders, which in turn can prolong hospitalization and hinder ideal growth curves (Vasconcelos *et al.*, 2022; Chen *et al.*, 2025). This complexity suggests an urgent need for effective, safe, and standardized interventions to support infant feeding and growth progression.

One promising non-pharmacological intervention is oral motor stimulation (OMS). This intervention is designed to stimulate the orofacial area to improve the strength and coordination of muscles involved in the breastfeeding process. A large body of scientific evidence, including systematic reviews and meta-analyses, has confirmed that oral motor interventions are significantly effective in accelerating the achievement of independent breastfeeding, shortening the length of hospital stay, and increasing weight gain at discharge (Mahmoodabadi *et al.*, 2024). Experimental studies have also specifically shown that preterm infants who received OMS showed significant improvements in breastfeeding performance and weight gain (Nath, Mukherjee and Guha, 2020). Although its effectiveness has been widely reported, studies that specifically measure the magnitude of weight change after the implementation of short-term intervention protocols (7 days) still need to be explored further to provide strong baseline data for the development of clinical practice in local settings.

Based on the background, the research problem is formulated as follows: "Is there a significant increase in weight in low birth weight infants after being given oral motor stimulation intervention for 7 days?". The rationale for this study is to provide measurable preliminary evidence regarding the positive impact of the short-term OMS protocol on weight gain in LBW infants. Thus, the objectives of this study are: (1) To measure the weight of LBW infants before being given intervention (pre-test), (2) To measure the weight of LBW infants

after being given OMS intervention for 7 days (post-test), and (3) To analyze whether or not there is a significant difference in weight between before and after intervention.

The hypothesis proposed in this study is that there is a significant increase in body weight in low birth weight infants after receiving oral motor stimulation intervention. To test this hypothesis, the study will be conducted using a pre-experimental design with a one-group pre-post test design. The results of this study are expected to provide an objective initial data basis for health workers in considering the implementation of the oral motor stimulation protocol as a routine clinical practice to optimize the nutritional status of LBW infants.

METHOD

This study used a pre-experimental design with a one-group pre-post test design to evaluate the effectiveness of oral motor stimulation on infant weight gain. The study was conducted in the Perinatology Room of R. Ali Manshur Hospital, Tuban, during December 2024 after obtaining ethical approval from the authorized ethics committee.

The target population was all low birth weight (LBW) infants treated in the unit during the study period. The sample was selected using a purposive sampling technique based on predetermined criteria. From a total of 19 infants, a final sample of 18 infants was obtained who met the inclusion criteria, namely birth weight below 2,500 grams, and did not meet the exclusion criteria, namely having congenital abnormalities (cleft lip) or suffering from severe asphyxia. Participation was voluntary and confirmed through informed consent signed by the parents after receiving a complete explanation of the purpose and procedures of the study.

The independent variable in this study was oral motor stimulation, while the dependent variable was daily weight gain. The oral motor stimulation intervention, consisting of perioral and intraoral stimulation, was given daily for 15 minutes, with a total duration of 7 days. The intervention procedure was standardized using a checklist sheet and was carried out in collaboration

with trained health workers. Weight data collection was carried out using a calibrated digital baby scale. Pre-test data (initial weight) were recorded on the first day before the intervention began, and post-test data (final weight) were recorded on the seventh day after the intervention was completed.

The collected data were analyzed using statistical software. Descriptive analysis was used to present the weight data before and after the intervention in the form of means and standard deviations. For inferential analysis, the data normality test was first performed using the Shapiro-Wilk test because the sample size was small (n<50). Based on the results of the normality test which showed that the data were normally distributed, hypothesis testing was performed using the Paired Samples t-Test. This test was used to determine whether there was a statistically significant difference in weight before and after the intervention, with a significance level (α) set at 0.05. All data were kept confidential and used only for the purpose of this study.

RESULT AND DISCUSSION

Table 1. Weight Distribution and Weight Gain of Respondents Before and After Intervention

Variables	n	Min Value	Max Value	Mean	SD	Shapiro-Wilk p-Value	Note
Pretest	18	1800	2400	2122.22	181.68	0.442	Normal
Posttest	18	2500	2815	2608.33	88.43	0.289	Normal
BB Increase	18	240	800	487.50	149.07		

Table 1 presents descriptive statistics of the respondents' weight variables. From a total of 18 respondents, it is known that the average weight before the intervention (pre-test) was 2122.22 grams with a standard deviation of 181.68 grams. After the intervention for 7 days, the average weight (post-test) increased to 2608.33 grams with a standard deviation of 88.43 grams. During the study period, the average weight gain of respondents was 487.50 grams, with the lowest

increase of 240 grams and the highest of 800 grams.

The results of the normality test using Shapiro-Wilk showed that the pre-test weight data had a p-value of 0.442 and the post-test data was 0.289. Since both p-values are greater than 0.05, it can be concluded that both data sets are normally distributed, thus meeting the assumptions for parametric testing.

Table 2. Paired Samples t-Test Results of Differences in Body Weight Before and After Intervention

Variables Compared	n	t-value	p-value	Information
Pre test and post test body weight	18	-13,736	<0.001	Significant

Table 2 shows the results of inferential analysis using the Paired Samples t-Test to determine the effect of oral motor stimulation intervention on weight gain. The test results show a t value of -13.736 with a p-value <0.001. This means that there is a very statistically significant difference between the average weight of infants before and after oral motor stimulation intervention. Thus, it can be concluded that the intervention given has a significant effect on increasing the weight of respondents. A negative t value indicates that the average in the second measurement (post-test) is higher than the first measurement (pre-test), which is in accordance with the objectives of the intervention.

This study aimed to analyze the effect of oral motor stimulation intervention on weight gain in LBW infants. The research hypothesis, which stated that this intervention would result in significant weight gain, was strongly supported by the data. An average weight gain of 486.11 grams ($p < 0.001$) was found after seven days of intervention, a strong and clinically relevant finding.

These findings are consistent with the majority of existing scientific literature. A randomized clinical trial by Arora et al. (2018) found that the Premature Infant Oral Motor Intervention (PIOMI) program not only significantly improved oromotor function scores (NOMAS) but also resulted in better weight gain in the intervention group (Arora *et al.*, 2018). Similarly, a quasi-experimental study by Amin et al. (2021) in Egypt reported that preterm

infants who received oral stimulation had higher discharge weights compared to the control group (Amin *et al.*, 2021). A study in Indonesia conducted by Izzaturrohmah and Zubaidah (2023) also showed similar results, where the PIOMI intervention in LBW infants successfully increased weight and LATCH scores (Izzaturrohmah and Zubaidah Zubaidah, 2023). This indicates that oral motor stimulation interventions are relevant and applicable in the context of neonatal care in Indonesia. This consensus is reinforced by systematic reviews, such as that conducted by Figueiredo et al. (2024), which concluded the positive effects of oral stimulation on breastfeeding performance, which indirectly supports weight gain (Figueiredo *et al.*, 2025).

The underlying mechanism for this success can be explained by the neuromuscular maturation theory. Oral motor stimulation does not directly increase body mass, but rather improves the infant's ability to feed efficiently. This intervention stimulates and strengthens the orofacial muscles, which are often immature in LBW infants. According to Dessirya et al. (2024), oral motor stimulation improves oral feeding readiness in preterm infants. When this oromotor function improves, the infant is able to better coordinate the suck-swallow-breathe reflex (Dessirya *et al.*, 2024). This improved coordination allows the infant to consume a larger volume of milk in a single feeding session with less energy expenditure, ultimately leading to faster weight gain (Nath, Mukherjee and Guha, 2020).

Although the majority of the literature supports these findings, our results differ from those of Younesian et al. (2015). In their study, although oral motor stimulation significantly accelerated the transition to independent breastfeeding and shortened the length of hospitalization, the intervention did not result in a significant difference in weight gain between the intervention and control groups (Younesian, Yadegari and Soleimani, 2015). This difference in results from our study may be due to several factors, such as variations in intervention protocols (duration, frequency), different sample characteristics (e.g., gestational age or comorbidities), or

differences in feeding practices across centers. Our study included term LBW infants in addition to preterm infants, who may have different physiological responses. In addition, the consistency and specific duration of our intervention (15 minutes for 7 days) may have provided the optimal "dose" to produce measurable metabolic effects, a factor that needs to be standardized in future studies. This highlights the importance of further research to standardize the most effective protocols.

The results of the researcher's observations during the provision of oral motor stimulation showed that most premature infants had a higher proportion of 'Good' sucking ability compared to term LBW infants. The researcher's opinion on this finding is that the most neurologically immature (premature) infants actually get the greatest functional benefits. This intervention seems to provide a functional "catch-up effect", helping them overcome maturity deficits more quickly. On the other hand, term LBW infants, who are neurologically more mature, tend to achieve higher absolute final weights, indicating that early maturity remains an important foundation for achieving growth (Park *et al.*, 2015).

The main limitation of this study is the use of a one-group pre-post test design without a control group, which did not allow for full isolation of the intervention effect from other confounding factors such as natural maturation. In addition, the small sample size (N=18) limits the generalizability of the findings. The study also did not measure intermediate variables such as volume of nutrient intake quantitatively or sucking efficiency, which could provide more detailed explanations of the mechanisms involved.

Based on the findings and discussion, a theory can be drawn that oral motor stimulation is not just a mechanical intervention, but a neuromaturation catalyst that bridges the gap between physiological maturity and functional readiness to eat effectively in LBW infants. This study confirms that structured short-term interventions can result in clinically significant weight gain.

Oral motor stimulation should be a standard component of nursing care in perinatology units. This

intervention is in line with the modern developmental care paradigm and cue-based feeding practices (Spagnoli *et al.*, 2023). For future studies, it is recommended to use an RCT design to confirm these findings, as well as conducting a cost-effectiveness analysis to strengthen the argument for its implementation in a wider clinical setting.

CONCLUSION AND SUGGESTION

Based on the results of the study, it was concluded that oral motor stimulation intervention had a significant effect on weight gain in low birth weight (LBW) infants ($p < 0.001$), which also answered the research hypothesis. However, this study has limitations due to the absence of a control group, so it cannot completely rule out the effects of natural maturation. Therefore, for further researchers it is recommended to conduct research with a Randomized Controlled Trial (RCT) design and a larger sample to confirm these findings. It is also recommended to examine intermediary variables such as breastfeeding efficiency and nutrient intake volume to explain the mechanism of change in more detail. For clinical practitioners, this intervention can be considered to be integrated as part of the standard of neonatal nursing care as a safe and non-invasive supportive method.

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