



BABY MASSAGE ASSISTANCE IMPROVES SLEEP QUALITY AND GROWTH OF LOW BIRTH WEIGHT BABIES IN SAMARINDA CITY

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ABSTRACT

Introduction: Low birth weight (LBW) is defined as a birth weight of less than 2.5 kilograms regardless of the neonate's gestational age, according to the World Health Organization (WHO). Indonesia is in the highest ranking in Southeast Asia, with an LBW percentage of more than 9.9%, which amounts to around 450 thousand births annually (WHO, 2023). Research in Wuhan, China, shows that babies with LBW are at risk of experiencing delays in motor development. One of the factors that influence a baby's growth is sleep and rest. Baby massage is an intervention that involves stroking using different movements uniformly throughout the baby's body. Baby massages have many benefits, including increasing body weight. Other research also proves that babies who are massaged have regular sleep patterns. **Method:** This type of research is quantitative, with a Quasi-Experimental Nonequivalent Control Group Design. The sample consisted of 36 breastfeeding mothers divided into 2 groups: the intervention and the control groups. In this research, the experimental group was given baby massage assistance, and the control group was given education via Zoom. **Results:** There were differences in LBW babies' growth, improved sleep quality before and after baby massage assistance in the intervention group, and education via Zoom in the control group. **Discussion:** Various efforts have been made to increase growth in LBW babies, one of which is by assisting with baby massage. A massaged baby will feel comfortable so that the baby can sleep longer, and the quality of the baby's sleep will improve. Sleep quality has a vital role in the growth of LBW babies. Babies with good quality sleep according to age will significantly impact their growth and development. **Conclusion:** Baby massage assistance and education can improve sleep quality and influence LBW babies' growth in Samarinda City.



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Keywords: BBLR, Baby Massage, Sleep Quality, Growth INTRODUCTION

Low birth weight (BBLR) is defined as a birth weight of less than 2.5 kilograms regardless of neonatal gestational age, according to the World Health Organization (WHO). BBLR contributes 60% to 80% of all neonatal deaths. The global prevalence of BBLR in 2020 reached 14.7% or around 19.8 million babies born with BBLR. WHO data recorded Asia-Pacific with a BBLR percentage of more than 8.7%. Indonesia is ranked highest in Southeast Asia with a BBLR percentage of more than 9.9%, which amounts to around 450 thousand babies born yearly (WHO, 2023).

Based on data from the Ministry of Health of the Republic of Indonesia (Kemenkes RI), the incidence of BBLR in Indonesia in 2019 was 111,827 cases (3.4%) out of 4,778,621 live births. This figure is lower than in 2020, which was 129,815 cases (3.1%) out of 4,747,077 live births, and in 2021 it was 111,719 cases (2.5%) out of 4,443,095 live births (Ministry of Health of the Republic of Indonesia, 2022).

According to the 2019 Health Profile, the number of BBLRs in East Kalimantan Province is 4.9%, while data from the Central Statistics Agency of Samarinda City show that there were 290 cases of BBLR in Samarinda in 2018 (Samarinda, 2019).

A study in Pakistan found BBLR to be the leading cause of growth failure in infants less than three years old. Research in Wuhan, China, also showed that babies with BBLR are at risk of delays in gross motor development, fine motor skills, and adaptability. (Zhang & Wang, 2019)

Baby massage is an intervention that involves swiping using different movements uniformly throughout the baby's body. Baby massages have many benefits, including increasing weight. (Field, 2019) (Y. Zhang et al., 2023)

Research has proven that massaged babies experience increased vagus nerve activity, leading to increased levels of gastrin and insulin absorption enzymes. So, food absorption will be better. (Salam et al., 2018) Other studies also prove that massaged babies have regular sleep patterns. (Seiiedi-Monastery et al., 2022a)

Baby massage assistance can be obtained in groups, individually, or online. Parents can continue practicing massage at home after getting a baby massage class. Health workers can provide baby massage training during routine by advising and encouraging mothers to massage their babies. (Midtsund et al., 2019) (Khuzaiyah, 2022) (Menici et al., 2021) (Menici et al., 2021)

RESEARCH METHODS

This type of research is quantitative, with a Quasi-Experimental design and *Nonequivalent Control Group Design*. In this study, there are two groups, namely one experimental group and one control group, which begins with an initial test (pretest) given to both groups and then treatment (*treatment*). The study ended with a final test (*posttest*), which was also given to both groups. In this study, the experimental group was treated by providing education and training on assessing and using developmental growth instruments and providing oxytocin massage interventions to mothers and infants. As for the treatment control group, education should be

provided online. The target population in this study is mothers and babies with low birth weights. Meanwhile, the affordable population is mothers who give birth with BBLR at Maternity Clinics and Health Centers in Samarinda City. The sampling technique in this study uses non-probability sampling, which is *purposive sampling*.

RESULTS AND DISCUSSION

Research Results

The normality test in this study uses *the Shapiro-Wilk test* because the number of samples is < 50 . The test results are not normally distributed, meaning that the test results are obtained with a value (*P value*) < 0.05 so that the test used in the pair test is an alternative, namely the *Wilcoxon Test*.

Table 3.1

Knowledge in the intervention and control group before and after being given Health Education about infant growth and massage

Group	Variable		Min	Max	Mean	Std. Dev	p-Value
Intervention	Growth Knowledge	<i>Pre-test</i>	4	7	5.67	1.085	0,000
		<i>Post-test</i>	9	12	11.06	.938	
	Baby Massage Knowledge	<i>Pre-test</i>	3	6	4.50	.985	0,000
		<i>Post-test</i>	7	10	9.00	.970	
Control	Growth Knowledge	<i>Pre-test</i>	5	8	6.00	.907	0,000
		<i>Post-test</i>	8	12	9.67	1.414	
	Baby Massage Knowledge	<i>Pre-test</i>	3	6	4.50	.985	0,000
		<i>Post-test</i>	7	10	9.00	.970	

Source: *Wilcoxon Test* Results, 2024

Table 3.1 presents the results of the Wilcoxon test conducted in the intervention and control groups. The test in the intervention group and the control group had a P-value of 0.000, so it can be concluded that Health Education affects maternal knowledge about the growth and massage of BBLR babies.

Table 3.2

Differences in Growth and Sleep Quality of Low Birth Weight Infants in the Intervention Group Before and After Infant Massage Assistance

Variable		Minimum	Maximum	Mean	Std. Dev	p-Value
Weight	<i>Pre-Test</i>	2240	2495	2373.06	97.274	0,000
	<i>1 Month</i>	3085	3640	3285.00	204.393	0,000
	<i>2 Months</i>	3285	204.393	4233.06	320.863	0,000
	<i>3 Months</i>	4650	5925	5167.78	455.293	0,000
Body Length	<i>Pre-Test</i>	46	48	47.28	.826	0,000
	<i>1 Month</i>	49	51	50.06	.873	0,000
	<i>2 Months</i>	52	55	53.44	1.338	0,000
	<i>3 Months</i>	56	60	57.72	1.708	0,000
Head Circumference	<i>Pre-Test</i>	31	33	32.17	.924	0,000
	<i>1 Month</i>	32	35	34.22	1.060	0,000
	<i>2 Months</i>	33	38	36.50	1.543	0,000
	<i>3 Months</i>	37	40	38.67	1.283	0,000
Baby's Sleep Quality	<i>Pre-Test</i>	2	5	3.72	.826	0,000
	<i>Post-test</i>	5	8	7.28	.958	

Source: Wilcoxon Test Results, 2024

Table 3.2 presents the results carried out in the intervention group. The test in the intervention group had a P value of 0.00, so it can be concluded that infant massage assistance improves the growth and sleep quality of BBLR.

Table 3.3

Differences in Growth and Sleep Quality of Low Birth Weight Babies in the Control Group Before and After Without Infant Massage Assistance

Variable		Minimum	Maximum	Mean	Std. Dev	p-Value
Weight	<i>Pre-Test</i>	2175	2495	2360.28	123.270	0,000
	<i>1 Month</i>	2805	3210	3054.44	126.699	0,000
	<i>2 Months</i>	2945	3890	3667.61	291.561	0,000
	<i>3 Months</i>	4225	4685	4514.56	136.950	0,000
Body Length	<i>Pre-Test</i>	45	47	45.78	.647	0,000
	<i>1 Month</i>	48	50	48.83	.618	0,000
	<i>2 Months</i>	51	53	51.83	.618	0,000
	<i>3 Months</i>	55	57	55.83	.618	0,000
Head Circumference	<i>Pre-Test</i>	30	33	31.44	.784	0,000
	<i>1 Month</i>	30	33	31.44	.594	0,000
	<i>2 Months</i>	34	36	35.28	.575	0,000
	<i>3 Months</i>	36	38	37.17	.707	0,000
Baby's Sleep Quality	<i>Pre-Test</i>	2	5	3.67	.804	0,000
	<i>Post-test</i>	4	7	5.61	.850	

Source: Wilcoxon Test Results, 2024

Table 4.3 presents the results performed on the control group. The test in the control group had a p-value of 0.00, so it can be concluded that there is an effect of increasing the growth and sleep quality of BBLR without the assistance of infant massage.

Table 3.4

Comparison of Infant Growth and Massage Knowledge in Mothers with Low Birth Weight Babies Intervention and Control Groups

Variable		Minimum	Maximum	Mean	Std. Dev	p-Value
Growth Knowledge	<i>Intervention</i>					
	<i>Control</i>	8	12	10.36	1.376	0,004
Baby Massage Knowledge	<i>Intervention</i>					
	<i>Control</i>	6	10	8.33	1.202	0,002

Source: Mann Whitney Test Results, 2024

Table 3.7 presents the post-test results from the intervention and control groups. Based on the analysis results, the *Mann-Whitney test* was used to compare mothers' knowledge about the growth and massage of BBLR babies.

In the intervention group and the control group, a P value of $< \alpha 0.05$ was obtained, indicating that H_0 was rejected, which means that there was a difference between the treatment after 3 months (Intervention) and no treatment (Control).

Table 3.5

Comparison of Growth and Sleep Quality of Low Birth Weight Infants Intervention and Control Groups

Variable		Min	Max	Mean	Std. Dev	p-Value
Weight	1 <i>Intervention</i>					
	Month <i>Control</i>	2802	3640	3169.72	204.345	0,001
	2 <i>Intervention</i>					
	Months <i>Control</i>	2945	4785	3950.33	416.547	0,000
	3 <i>Intervention</i>					
	Months <i>Control</i>	4225	5925	4841.17	468.526	0,000
Body Length	1 <i>Intervention</i>					
	Month <i>Control</i>	48	51	49.44	969	0,000
	2 <i>Intervention</i>					
	Months <i>Control</i>	51	55	52.64	1.313	0,000
	3 <i>Intervention</i>					
	Months <i>Control</i>	55	60	56.78	1.588	0,000
<i>Intervention</i>						

Head Circumference	<i>1</i>	<i>Control</i>	32	35	33.78	.959	0,007
	<i>Months</i>						
	<i>2</i>	<i>Intervention</i>					
	<i>Months</i>	<i>Control</i>	33	38	35.89	1.304	0,007
	<i>3</i>	<i>Intervention</i>					
	<i>Months</i>	<i>Control</i>	36	40	37.92	1.273	0,001
Baby's Sleep Quality		<i>Intervention</i>					
		<i>Control</i>	4	8	6.44	1.229	0,000

Source: Mann Whitney Test Results, 2024

Based on Table 4.27, the results of the post-test from the intervention group and the control group are presented. Based on the results of the analysis using *the Mann-Whitney* test to see the comparison of BBLR growth and sleep quality in the intervention group and the control group, a P value of $< \alpha 0.05$ was obtained, indicating that H_0 was rejected, which means that there was a difference between the treatment after 3 months (Intervention) and no treatment (Control).

DISCUSSION

Knowledge in the Intervention and Control Groups Before and After Being Given Health Education on Infant Growth and Massage

Based on the results of the analysis of *the Wilcoxon* test in both groups, both the intervention group and the control group, a p-value of $0.000 < (\alpha=0.005)$ was obtained, so it can be concluded that there is an influence of Health Education on maternal knowledge about infant growth and massage.

The results showed that the average pre-test score of growth in the intervention group was (5.67) and the average *post-test score* with a score of (11.06). For the average knowledge of infant massage, the average results of *the pre-test* (4.50) and *post-test* (9.00) were obtained.

Then, the control group research results showed that the average *pre-test* score for growth was a score (6.00), and the average *post-test score* was a score (9.67). For the average knowledge of infant massage, the average results of *the pre-test* (4.44) and *post-test* (7.78) were obtained.

Thus, there was an increase in maternal knowledge about infant growth and massage before and after being given health education in the intervention group and control group.

This aligns with research showing that education is very effective in increasing mothers' knowledge about baby massage and preventing toddler stunting. (Romadhona Haque & Listy Fauziah, 2024)

This aligns with research showing a difference in maternal knowledge before and after providing infant massage health education. (Andria et al., 2021)

This research also aligns with research that says that online health promotion/education about nutrition aimed at parents is efficacious in improving nutrition-related outcomes in children and parents in increasing child growth. (Zarnowiecki et al., 2020)

According to the assumption of Health Education researchers, it is proven to influence increasing maternal knowledge about infant massage and growth.

Differences in Growth and Sleep Quality of Low Birth Weight Infants in the Intervention Group Before and After Infant Massage Assistance

Based on the results of the test analysis

Wilcoxon in the intervention group obtained a p-value of $0.000 < \alpha (0.05)$, so it can be concluded that there is an effect of infant massage assistance on increasing the growth and sleep quality of BBLR in Samarinda City.

The results of this study showed that, on average, before the treatment was given, the results of BB (2373.06 grams), PB (47.28 cm) and LK (32.17 cm) were obtained. Then, after being given baby massage assistance for 3 months, the growth results increased to BB (5167.78 grams), PB (57.72 cm), and LK (38.67 cm).

The study's results also showed that the average pre-test of sleep quality before being given massage assistance was (3.72), and after being given massage assistance for babies was (7.28).

This is according to a study that showed that the average total sleep time was higher in the massage group than the control group, which may show a positive effect of massage on the development of sleep patterns in these babies. (Seiiedi-Monastery et al., 2022)

This is in line with research (Ostrin, 2019) on *ocular and systemic melatonin and the influence of light exposure*, which shows that the increase in the quantity of sleep in babies given massage is due to the increased secretion of serotonin levels produced during massage. Serotonin is the primary transmitter that accompanies the formation of sleep. When massaged, it also releases Melatonin, which plays a role in sleep and makes sleep longer and better at night.

This study also aligns with research that showed that weight, height and head circumference increased significantly in the intervention group. (X. Zhang & Wang, 2019b)

Research also says that baby massage can increase the growth of babies with a history of low birth weight at the age of 1-6 months. (Puji Lestari et al., 2021)

According to the study, based on literature studies, baby massage tends to relieve pain, cure jaundice and increase weight. (Mrljak et al., 2022)

According to the assumption of researchers, infant massage assistance can influence parents to massage babies independently and consistently to improve the quality of baby sleep and their growth.

Differences in Growth and Sleep Quality of Low Birth Weight Babies in the Control Group Before and After Without Infant Massage Assistance

Based on the results of the test analysis

Wilcoxon in the intervention group obtained a p-value of $0.000 < \alpha (0.05)$, so it can be concluded that there is an increase in the growth and sleep quality of BBLR in Samarinda City without massage assistance.

The results of this study showed that the average growth before the treatment was obtained with the results of BB (2360,270 grams), PB (45.78 cm) and LK (31.44 cm). Then, the growth increased to BB (4514.56 grams), PB (55.83 cm), and LK (37.17 cm) after 3 months without the assistance of baby massage.

The study's results also showed that the average *pre-test* sleep quality was (3.67), and the post-test results were (5.61).

This study is in line with the results, which showed that respondents' knowledge increased after being educated about baby massage and the baby gym. In addition, respondents' sleep quality also improved after being given a baby massage and baby gym. (Achirda et al., 2022)

The role of health workers is to educate and practice baby massage for mothers to stimulate the growth and development of babies. (Puji Lestari et al., 2021)

According to the researchers' assumptions, the improvement in the growth and quality of infant sleep still takes place even without the assistance of infant massage. However, the increase was not as much as the group was given infant massage assistance. The changes in growth in the control group can occur because the babies in this study are in the growth spurt period.

Comparison of Growth Knowledge and Infant Massage Knowledge in Mothers with Low Birth Weight Babies Intervention and Control Groups

Based on the results of the analysis of *the Mann-Whitney* test in the intervention and control groups, the results of p-value $0.004 < \alpha (0.05)$ for growth knowledge and p-value $0.002 < \alpha (0.05)$ for infant massage knowledge so that it can be concluded that there is a comparison between growth knowledge and infant massage knowledge in both groups.

According to Saputro and Bahiya (2021), health workers should counsel mothers who have babies about baby massage to motivate them to learn to do it independently.

This research also supports this research, showing a significant relationship between maternal knowledge and infant massage therapy. (Laili & Aditya Sari, 2021)

This is also in line with research that shows a significant relationship between maternal knowledge and maternal independence in performing baby massage independently (Barus & Sembiring, 2022). Click or tap here to enter text.

According to the researcher's assumptions, the mother's knowledge level improves after receiving health education about baby massage and growth. This makes the mother's attitude better. With a change in attitude from negative to positive, it is hoped that this positive attitude will be a motivation to be able to do self-massage on babies.

Comparison of Growth and Sleep Quality of Low Birth Weight Infants Intervention and Control Groups

Based on the results of the analysis of the *Mann-Whitney* test in the intervention and control groups, a P value of $0.000 < \alpha (0.05)$ was obtained on the growth and sleep quality of BBLR so that it can be concluded that there is a comparison between the growth and sleep quality of BBLR in both groups.

This research is in line with the research conducted, which shows that there is an effect of baby massage and baby spa interventions, which are carried out routinely 1 time per week 4 times with a treatment duration of 20 to 30 minutes, on the growth and motor development of babies aged 3-6 months. (Qibtiah, 2023)

Another study showed that applying a 15-minute daily massage therapy and kinesitherapy protocol in an intervention group conducted by parents of hospitalized premature infants could significantly impact the development of weight, size, and head circumference compared to the control group. (Álvarez et al., 2019)

Research says that baby massage increases the body's vagal activity (nervous activity), thereby triggering the release of hormones that play a role in the absorption of food, such as gastrin and insulin, and indirectly increasing the baby's appetite and weight. (Puji Lestari et al., 2021)

Other research related to the quality of baby sleep also supports the fact that baby massage tends to improve the quality of baby sleep. Therefore, Midwifery students need to acquire baby massage skills and introduce this method to mothers, especially those with babies 3-12 months. (Nasution et al., 2021)

Other research shows that baby massage can improve babies' sleep quality, especially in babies with poor sleep quality. Therefore, health workers should counsel mothers who have babies about baby massage so that they are motivated to learn to do it independently. (Saputro & Bahiya, 2021)

Researchers have assumed that infant massage assistance is proven to improve infant sleep, which plays a vital role in the growth of BBLR babies.

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