ORIGINAL ARTICLE

The Effect of Nesting on Physiological Changes in Low Birth Weight Babies in the Perinatology Room of Betha Medika Hospital

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ABSTRACT

Introduction: Infants with Low Birth Weight (LBW) require special attention in care because they are prone to changes in self-adjustment, so exclusive care is needed to improve their physiological conditions, one of which is the nesting method. The physiological changes observed were body temperature, respiratory frequency, pulse frequency, and oxygen saturation. Previous studies have shown inconsistent results due to differences in duration, frequency, and parameters measured. Some studies only assessed some indicators and involved additional interventions that made it difficult to isolate the pure nesting effect. The purpose of the study was to determine the effect of nesting on physiological changes in LBW babies in the Perinatology Room of Betha Medika Hospital. **Methods:** This type of research uses pra-experimental with one group pre-test and post-test design. The study population consisted of low birth weight (LBW) infants in the Perinatology Ward of Betha Medika Hospital, with a sample size of 17 babies using total sampling. Data collection used pulse oximeter, thermometer, stop watch, and check list sheet. Statistical analysis using paired sample t test. **Results:** The results showed that there were differences between pretest and posttest scores for body temperature (p=0.003), breathing frequency (p=0.000), pulse frequency (p=0.000), and oxygen saturation (p=0.000). This suggests that the nesting method affects physiological changes in LBW babies. **Conclusion:** There is an effect of the nesting method on physiological changes (body temperature, respiratory frequency, pulse frequency, and oxygen saturation) in LBW babies in the Perinatology Room of Betha Medika Hospital.
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INTRODUCTION

Health is one of the basic human needs. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition. The right to health for all people means that everyone should have access to the health services they need, when and where they need them, without suffering financial hardship (1).

The birth of babies with LBW is still a global concern, because this condition is one of the factors causing death in newborns (2). According to the United Nations Children's Fund (UNICEF), an estimated 19.8 million newborns, or 14.7% of all babies born globally in 2020, suffered from LBW (3). Based on the 2023 Indonesian Health Survey (SKI), the incidence of low birth weight (LBW) in Indonesia was 6.1%, and 23.6% of LBW babies did not receive special care (4).

LBW is defined as a baby born weighing less than 2,500 grams, and in its early life has a high risk of health problems because its organs have not developed optimally (5). This condition makes the care of LBW needs to be done optimally. Problems that often occur in LBW are related to body mechanisms that have not functioned optimally and organs that are still immature or premature. Some of them are disorders of the suction and cough reflexes caused by weak reflexes in the nerve center layer (6).

Weight imbalance in LBW causes the fat layer on the baby's skin to become thinner, which can result in heat loss or hypothermia (7). Babies who experience cold require more calories to maintain their body temperature. Meanwhile, babies born normally are able to increase their body temperature by crying or increasing their motor activity in response to discomfort. However, crying can increase the body's workload and lead to excessive energy consumption (8).

Based on this, it is necessary for health workers to support the improvement and growth of health status in infants by performing developmental care, which is a concept of neonate care designed to support the improvement of neonate growth and development according to specified criteria (9). Many efforts can be made to reduce the incidence of LBW, such as performing infant massage, music therapy, kangaroo method care, and nesting (10). Nesting is one of the known methods used to help keep the baby in position, thus saving energy and reducing the risk of weight loss (11).

Nesting is a tool used in the perinatology room, made of phlanyl material with a length of about 121 cm to 132 cm, which can be adjusted to the baby's body size. This tool is designed for premature or LBW babies with the aim of minimizing neonate movement as an effort to save energy, which is part of nursing intervention (11). Nesting and flexion positioning of infants are part of environmental management in developmental care. Nesting serves to support the baby's body while providing a comfortable place (12).

The advantage of the nesting method is that it can be done without involving the baby's mother. This method can be applied immediately after the baby is born without the need to wait a few days (13). The application of the nesting method is also able to provide comfort and calmness for babies, especially LBW babies or premature babies, to help them adapt to the environment (14). In addition, this method can prevent complications caused by changes in position due to the influence of gravitational forces (15).

Although a number of studies have reviewed the effects of nesting on LBW infants, there are still methodological variations, such as differences in intervention duration, measurement frequency, and physiological parameters assessed, so the results are not entirely consistent. Some studies focus only on one or two indicators, without assessing overall physiological changes. In addition, the presence of additional interventions such as prone positioning and maternal education in some studies makes it difficult to isolate the pure effect of nesting. Therefore, research with a more controlled and comprehensive approach is needed to assess the effect of nesting on the main physiological parameters of LBW infants.

The purpose of the study was to determine the effect of nesting on physiological changes in LBW in the Perinatology Room of Betha Medika Hospital. This study is useful in providing scientific evidence-based insights that can help neonatal nurses improve the care of LBW infants through nesting interventions by supporting better physiological function that can potentially reduce the risk of complications.

MATERIALS AND METHODS

Study Design

This research used a pra-experimental with one group pre-test and post-test design. This study compared the results of the pretest and posttest in the experimental group. This study was conducted at Betha Medika Hospital, Sukabumi City, West Java Province, Indonesia. Ethical clearance was obtained prior to data collection (No.000021/KEP STIKES SUKABUMI/2025).

Sample

The research was conducted from August 2023 to February 2024. The study population was LBW babies in the Perinatology Room of Betha Medika Hospital as many as 17 babies. Inclusion criteria included infants with their parents' willingness to become respondents and birth weight 1000-<2500 grams. While the exclusion criteria include babies with congenital abnormalities (congenital defects), babies who experience respiratory distress, and babies declared unable to nest by health workers in the Perinatology Room of Betha Medika Hospital. The sampling technique used total sampling.

Instrument

The measuring instruments used in this study included pulse oximeters, thermometers, stopwatches, observation sheets, and standard operating procedures for monitoring, which were routinely calibrated according to standards so that they were valid and reliable; measurements were taken using these devices without any mention of manual measurements requiring inter-observer reliability testing; the nesting devices used were uniform in terms of density, size, and shape in accordance with the standards applied in the perinatology room; in addition, observation sheets and nesting intervention protocols were used to record the duration of nesting per day, the condition of the baby during the intervention, and other relevant data, with monitoring carried out for 24 hours and therapy carried out for three consecutive days, where pre-test data was taken before the intervention and post-test data was taken after the intervention was completed on the third day.

Data Analysis

Data analysis used descriptive analysis to describe each category of respondent characteristics, univariate analysis using mean value, standard deviation, minimum value, and maximum value to measure body temperature, respiratory frequency, pulse frequency, and oxygen saturation. Normality test using Shapiro Wilk with results on all variables normally distributed ($p > 0.05$). Statistical analysis using paired sample t-test.

RESULTS

Based on table I, it can be seen that most respondents had a birth weight of 1500-2499 grams as many as 12 babies (70.5%), gestational age <37 weeks as many as 10 babies (58.8%), and male gender as many as 9 babies (52.9%).

Based on table II shows that the results of the pretest and posttest mean values of respondents' body temperature increased from 35.85 (0.473) to 36.81 (0.146). Meanwhile, the results of the mean value of pretest and posttest breath frequency decreased from 53.09 (7.300) to 49.03 (3.424). While the results of the mean value of the pretest and posttest pulse frequency increased from 126.85 (12.260) to 137.41 (6.734). Furthermore, the results of the average value of pretest and posttest oxygen saturation increased from 96.15 (2.426) to 99.26 (0.511).

Table III shows that there is a difference in the average pretest and posttest scores on body temperature (p=0.003), breathing frequency (p=0.000), pulse frequency (p=0.000), and oxygen saturation (0.000). These results indicate that there is an effect of nesting on physiological changes in LBW babies.

Table I: Respondent Characteristics

Characteristics Of Respondents	F	%
Birth Weight (Gram)		
1000-1499	5	29,5
1500-2499	12	70,5
Gestational Age (Weeks)		
<37	10	58,8
37-42	7	41,2
Gender		
Male	9	52,9
Female	8	47,1
Total	17	100

Table II: Univariate Analysis of Physiological Parameters Before and After Nesting in Low Birth Weight Babies

Variables	N	Mean	STD	Min	Max
Body Temperature	17				
Pretest		35,85	0,473	34,80	36,40
Posttest		36,81	0,146	36,50	37.10
Breathing Frequency	17				
Pretest		53,09	7,300	40	67
Posttest		49,03	3,424	44	55
Pulse Frequency	17				
Pretest		126,85	12,260	112	155
Posttest		137,41	6,734	124	150
Oxygen Saturation	17				
Pretest		96,15	2,426	91	98
Posttest		99,26	0,511	98	100

Table III: Bivariate Analysis of the Effect of Nesting on Physiological Changes in Low Birth Weight Babies

Variables	Mean	Mean Difference	SD	t	p-value
Body Temperature					
Pretest	35,85	-0,961	0,473	-13,174	0,003
Posttest	36,81		0,146		
Breathing Frequency					
Pretest	53,09	4,059	7,300	3,652	0,000
Posttest	49,03		3,424		
Pulse Frequency					
Pretest	126,85	-10,559	12,260	-5,740	0,000
Posttest	137,41		6,734		
Oxygen Saturation					
Pretest	96,15	-3,118	2,426	-7,838	0,000
Posttest	99,26		0,511		

DISCUSSION

The results showed that there was an effect of nesting on body temperature, breathing frequency, pulse frequency, and oxygen saturation in LBW babies. This research is supported by Pratama & Sulistyawati; Kuraesin; Witartiningsih & Aniroh; Putri & Rahmah; Unnikrishnan & Aneesha; Magor et al., who explained that there is an effect of nesting on body temperature, breathing frequency, pulse frequency, and oxygen saturation in LBW babies (16, 6, 2, 17, 18, 19).

LBW babies tend to have a thin, transparent layer of fat under the skin, and a small body size, so they tend to experience hypothermia. The hypothermia can cause an increase in metabolism, creating a compensatory increase in oxygen and calorie consumption. If the available oxygen is not increased to accommodate the demand, the arterial oxygen pressure will decrease which will affect the respiratory frequency. In addition, LBW babies are prone to stress due to the immaturity of the body's organ systems which can create changes in increased heart rate and oxygen saturation (16, 18, 2, 19).

Nesting is the installation of cloth formed to resemble the condition of the mother's uterus to maintain the flexion position of the baby. The installation of nesting in low birth weight babies places the baby in a physiological flexion position, including flexion of all joints, protraction of the scapula, and an ideal posterior pelvic tilt, so that the position provides warmth and increases blood supply to the periphery of the body and brain (20, 21).

The use of nesting is effective to make the baby flexion, which in turn can minimize heat loss due to exposure to the outside environment temperature. LBW infants in a flexion position increase hand-to-mouth activity and hand grasping. This condition indirectly increases

muscle movement activity which is directly proportional to an increase in metabolism, thus leading to an increase in body temperature (22, 16, 25).

The installation of nesting makes the baby calmer and shows a decrease in stress levels characterized by reduced cortisol levels in the body. The decrease in cortisol levels affects the limbic area and insular cortex in the brain which further stimulates the production of oxytocin. The hormone oxytocin plays a role in calming the baby and helps stabilize the cardiorespiratory system. During the application of nesting, the baby's position is arranged so that it is not always in a supine position to reduce the risk of diaphragm compression, so that the baby's respiratory system function can be optimized (11, 15).

Giving nesting to infants affects changes in pulse frequency. The baby's increased pulse rate is due to the baby being in a hypothermic condition, so the body provides a stimulus with increased heart work, cell metabolism, and oxygen demand. The application of nesting and positioning the baby as in the mother's womb can make the baby feel more comfortable, so that the pulse frequency can become more stable (26, 27).

The nesting position provides support for the baby's flexed sleeping position, so that it can improve oxygen saturation, lung expansion, chest wall expansion, and the process of decreasing the incidence of apnea in newborns. The nesting position can help improve lung ventilation by improving alveolar expansion and reducing intra-thorax pressure that occurs when the baby is in a nested position. By increasing lung ventilation, oxygen supply to the blood increases and improves oxygenation status (24, 17).

This study has limitations in terms of the relatively small sample size, involving only 17 LBW infants. Therefore, further research with a larger sample size is needed to obtain more representative results and increase the validity of the findings.

CONCLUSION

There is an effect of nesting on physiological changes in LBW babies, including body temperature, respiratory frequency, pulse frequency, and oxygen saturation in the Perinatology Room of Betha Medika Hospital.

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