Proceedings of the 2nd Syedza Saintika International Conference on Nursing, Midwifery, Medical Laboratory Technology, Public Health, and Health Information Management (SeSICNiMPH 2021)

The Effect of Nesting on Changes in Physiological Stress in Low Birth Weight Babies

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ABSTRACT
Babies with low birth weight (LBW) often experience several problems due to organ characteristics that are not yet perfect at birth, causing physiological stress. In the Perinatology Room, Dr M. Zein Painan there is no special handling effort to overcome physiological stress in LBW infants. The purpose of this study was to determine the effect of nesting on changes in physiological stress in infants with low birth weight (LBW) in the Perinatology room of RSUD DR. M. Zein Painan in 2019. The type of research is a Quasi-Experiment Design with a two-group pretest-posttest design. The research was conducted in the Perinatology room of RSUD DR. M. Zein Painan. The population in this study were all LBW infants who were being treated in the Perinatology room. The number of samples is as many as 16 people with the purposive sampling technique. Univariate data analysis with mean distribution table and bivariate analysis with independent T-test test. The results of the study obtained mean pulse frequency in the treatment group (pretest 152.00 and posttest 143.50), respiratory rate (pretest 59.63 and posttest 51, 88) and oxygen saturation (pretest 91.58 and posttest 98.25). The results of statistical tests showed that there were differences in the mean pulse frequency (p= 0.000), respiratory rate (p= 0.002) and oxygen saturation (p= 0.000) in the treatment group and the control group, where there was an effect of nesting on changes in physiological stress in infants with body weight. low birth weight (LBW) in the Perinatology room at RSUD DR. M. Zein Painan. This study concludes that there is an effect of nesting on changes in physiological stress in infants with low birth weight (LBW).

Keywords: *LBW, Nesting, Physiological Stress*

1. INTRODUCTION

According to data from the World Health Organization (WHO) in 2015, the prevalence of LBW babies is estimated at 18% of all births in the world with a limit of 33-38%. Globally, the birth rate of LBW in the world has increased from 15.5% to 16.5% (2009- 2014 period). The highest incidence occurred in Central and South Asia (27.1%) and the lowest in Europe (6.4%). The mortality rate for LBW infants with physiological disorders is 35 times higher than in infants with birth weights of more than 2,500 grams.

Statistical data shows that 90%of LBW cases are found in developing countries, including Indonesia. The incidence of babies with low birth weight (LBW) in Indonesia varies greatly from one region to another, ranging from 9%-30%. The results of the study in 7 multicenter areas obtained LBW rates in the range of 2.1%-17.2%. Nationally, based on further analysis of the IDHS, the LBW rate is around 10.5%. Where LBW babies are one of the causes of infant mortality in Indonesia, they are still classified in the high category, namely 34 per 1000 live births.[1]

In West Sumatra in 2014 around 2066 cases or equivalent to 2.2% of the number of births. Meanwhile, the infant mortality rate in West Sumatra Province was 681 people spread across 19 districts/cities with the highest contributor to death from the city of Padang, which was 108 babies. Especially in Pesisir Selatan Regency, the incidence of LBW is 10th with a percentage of 2.4% of the number ofbirths.

Oxygen saturation is a picture of the flow of oxygen in the body which is very important for optimal function of the heart and other organs because oxygen is a metabolic fuel. In LBW infants, there is an increase in metabolism which results in the baby's body requiring more oxygen consumption to maintain the body's physiological condition. Low blood oxygen levels in infants with low birth weight cause a decrease in oxygen saturation.[2]

If the problem of physiological stress in LBW babies is not handled properly, it will have a bad impact on their health status. In addition, LBW infants are at a higher risk of experiencing morbidity, impaired growth and infant mortality. Where this must be anticipated and managed in the neonatal period. So it is necessary to carry out nursing management for LBW infants to adapt to extrauterine conditions.[3]

The treatment environment management strategy that can be done to reduce health problems that cause death in LBW infants is developmental care. The positive impact of developmental care requires nurses to play an active role in its application to babies in hospitals, especially at-risk babies such as babies with low birth weight. The goal is to provide nursing care to have a positive influence on the growth, development and improvement of health status for LBW infants who are treated in special rooms such as Perinatology. [4]

One of the efforts of environmental management indevelopmental care that is effective and easy for nurses to do in the perinatologyroom is the nesting technique that can facilitate the development of LBW infants in the form of physiological and neurological conditions. Provision of nesting or nest to accommodate excessive movement and give the baby a comfortable place.[5]

Nesting is a tool used in the Perinatology room made of phlanyl material with a length of about 121 cm- 132 cm or you can use a blanket roll that can be adjusted to the baby's body length. The nesting tool is oval and resembles the condition in the mother's womb. The purpose of using nesting is to protect the baby's position, to preventdrastic changes in the baby's positionwhich can cause a lot of energy loss from the neonate's body, and to increase comfort to reduce physiological stressin LBW babies.[6]

The nesting technique should surround the baby and the baby in a flexed position. The flexion position during nesting is expected to prevent the baby from expending energy which is still needed for growth and development. The nesting technique can be carried out for 3 days and monitoring is carried out every day to see physiological changesin LBW infants.[7]

The nesting device is made according to the conditions in the mother's womb which is adjusted to the length of the baby's body. This position can help the baby stabilize heart rate and breathing, create energy reserves that are not used by the body but are beneficial for the growth of body cells, and improve sleep quality. Wherewith deep sleep conditions in nesting can reduce physiological stress problems so that LBW babies can maintain energy conservation and achieve optimal growth and development.[8]

Research conducted by Utamion the effect of implementing developmental care on physiological stress in LBW infants in Surakarta. Inthis study, the results of observationsand statistical analysis of differences in physiological stress after developmentalcare were carried out in the control group and treatment group were that there were differences in oxygen saturation before developmental care in the control group and the treatment group with a p-value (0.000). This shows that there is an effect of implementing developmental care onphysiological stress in LBW infants. [9]

Supported by research conducted by Zen on the effect of nesting on physiological and behavioural changes in premature infants in Tasikmalaya, it was found that there were differences in the average physiological and behavioural changes before and after nesting. Statistical test results obtained p-value (0.000) indicates that there is an effect of nesting on physiological changes and behaviour of premature babies.[6]

Based on the neonatal care data in the perinatology ward of Dr M. Zein Painan, LBW babies are the second cause of infant mortality after asphyxia. Where in 2015 the number of LBW babies who were treated in the perinatology room was 146 people. In 2016 there were 154 LBW babies and an increase in 2017 there were 168 LBW babies who were treated. Meanwhile, in 2018 data for premature babies who were treated from January to August 2018 reached 94 people.

A preliminary survey was conducted by researchers on November 19, 2018, in the perinatology room of Dr General Hospital. M. Zein Painanobtained as many as 7 LBW babies whowere treated. Where from 7 LBW babies, 5 of them experienced physiological problems, namely 3 people experiencing an increase in respiratory rate, 1 person experiencing an increase in pulse rate and 1 person experiencing a decrease in oxygen saturation. Based on the results of observations in the Perinatology room, RSUD Dr M. Zein Painan that there is no implementation of care environment management with nesting techniques toreduce physiological stress in LBW infants. Where LBW babies who aretreated are only swaddled and blanketed then the nurse provides an incubatorcover to reduce the intensity of lighting.

According to the results of interviews with 4 nurses who work in the Perinatology room, they said they did not know the techniques and benefits of nesting for changes in physiological stress in LBW infants. So it is necessary to do effective nursing management to overcome these problems. Therefore, researchers have researched the effect of nesting onchanges in physiological stress ininfants with low birth weight (LBW) in the Perinatology room of Dr M. Zein Painan in 2019.

2. METHODS

This type of research is a Quasi Experiment Design with a two-group pretest-posttest design. This research was conducted with two groups of respondents, namely the treatment group and the control group. Nesting was given to the treatment group while the control group was not given nesting. Then the first measurement of physiological changes (pretest) and the second measurement (posttest). The sample of this study was LBW infants who were treated at RSUD Dr M. Zein Painan. The number of samples taken in this study initially was 16 people. The samples in this study were categorized into 2 groups, namely 8 people in the treatment group and 8 people in the control group. The sampling technique in this study was purposive sampling, namely LBW infants who were being treated in the Perinatology room of RSUD Dr M. Zein Painan during the time the research was conducted and by the research criteria that the researchers set.

In the treatment group, nesting and measurements for each respondent were carried out for 3 days. The researchers first assessed the pulse rate using infant pulse oximetry, assessed the respiratory rate by observing breathing for 1 full minute and assessing oxygen saturation using infant pulse oximetry before being given a nesting intervention (pretest) on the firstday, then given nesting intervention for 3 days. consecutively and monitored every day for 24 hours. After that, the physiological changes in pulse frequency were measured again using infant pulse oximetry, measuring respiratory rate for 1 full minute and measuring oxygen saturation using infant pulse oximetry after nesting (posttest) on the third day. While in the control group, the measurement of the physiological changes of the respondents was also carried out for 3 days. In the first measurement, the researcher assessed the pulse rate with infant pulse oximetry, measured respiratory rate for 1 full minute and measured oxygen saturation with infant pulse oximetry (pretest) on the first day without any nesting intervention but was controlled for 3 consecutive days and monitored every day. for 24 hours. After 3 days the researchers reassessed the pulse rate with infant pulse oximetry, measured the respiratory rate for 1 full minute and measured the respondent's oxygen saturation with infant pulse oximetry (posttest) on the third day.

3. RESULTS

Table 1. Average pulse rate, respiratory rate and oxygen saturation before and after nesting in the treatment group

Variable		N	Mean	SD	Min	Max
Pulse rate	Pretest	8	152	10,296	140	165
	Postest	8	143,5	9,087	132	154
Breathing	Pretest	8	59,63	5,579	50	69
frequency	Postest	8	51,88	4,794	44	59
Oxygen saturation	Pretest	8	91,58	2,726	88	96
	Postest	8	98,25	1,282	96	100

Based on Table 1, it can be seen the analysis of the average pulse rate, respiratory rate and oxygen saturation before and after nesting in the treatment group. The mean pulse frequency before nesting was 152.00 with a standard deviation of 10.296, a minimum valueof 140 and a maximum value of 165. The average pulse frequency after nesting was 143.50 with a standard deviation of 9.087, a minimum value of 132 and a maximum value of 154. nesting was 59.63 with a standarddeviation of 5.579, a minimum value of 50 and a maximum value of 69. The average respiratory rate after nesting was 51.88 with a standard deviation of 4.794, the minimum value was 44 and the maximum value was 59. The mean oxygen saturation before nesting was 91.58 with The standard deviation is 2.726, the minimum value is 88 and the maximum value is 96. The average oxygen saturation after nesting is 98.25 with a standard deviation of 1.282, the minimum value is 96 and the maximum value is 100.

Table 2. The mean pulse rate, respiratory rate and oxygen saturation in the first and second measurements without nesting in the control group

Variable	N	Mean	SD	Min	Max
Pulse rate Pretest	8	143	15,19	120	164
Postest	8	141,9	14,26	120	162
Breathing frequency Pretest	8	47,5	75,21	40	60
postest	8	48	6,525	42	60
Oxygen saturation Pretest	8	96,75	1,165	95	98
Postest	8	97,88	1,357	96	100

Based on Table 2, can be seen the analysis of the mean pulse rate, respiratory rate and oxygen saturation in the first and second measurements without nesting in the control group. The average pulse frequency in the first measurement is 143.00 with a standard deviation of 15.194, the minimum value is 120 and the maximum value is 164. The average pulse frequency in the second measurement is 141.88 with a standard of 14.257, the minimum value is 120 and the maximum value is 162. The average respiratory rate in themeasurement The first measurement is 47.50 with a standard deviation of 75.21, the minimum value is 40 and the maximum value is 60. The average respiratory rate in the second measurement is 48.00 with a standard deviation of 6.252, the minimum value is 42 and the maximum value is 60. The average oxygen saturation in the first measurement is 96.75 with a standard deviation of 1.165, a minimum value of 95 and a maximum value of 98. The mean oxygen saturation in the second measurement was 97.88 with a standard deviation of 1.357, the minimum value of 96 and the maximum value of 100.

Table 3. Differences in mean pulse frequency, respiratory rate and oxygen saturation before and after nesting in the treatment group

Variable	N	Selisih Mean	SD	SE	T	95% CI		p-value
						Lower	Upper	
Pulse rate	8	8,5	2,33	0,824	10,319	6,552	10,448	0
Breathing frequency	8	7,75	3,327	1.176	6,588	4,968	10,532	0
Oxygen saturation	8	-6,75	1,832	0.648	-10,42	-8,282	-5,218	0

Based on Table 3 shows the difference in the mean pulse frequency, respiratory rate and oxygen saturation before and after nesting in the treatment group. The difference in the mean pulse frequency before and after nesting is 8,500 with a standard deviation of 2,330. The results of statistical tests using the T-test dependent test obtained a p-value of 0.000 (<0.005), this proves that there is an effect of nesting on the decrease in pulse frequency in infants with low birth weight (LBW) in the treatment group in the Perinatology Room of RSUD Dr M. Zein Painan in 2019. The difference in the mean frequency of breath before and after nesting is 7,750 with a standard deviation of 3,327. The results of statistical tests using the T-test dependent test obtained a p-value of 0.000 (<0.005), this proves that there is an effect of nesting on decreasing respiratory frequency in infants with low birth weight (LBW) in the treatment group in the Perinatology Room of RSUD Dr M. Zein Painan in 2019. The difference in the average difference in oxygen saturation before and after nesting is -6.750 with a standard deviation of 1.832. The results of statistical tests using the T-test dependent test obtained a p-value of 0.000 (<0.005), this proves that there is an effect of nesting on increasing oxygen saturation in infants with low birth weight (LBW) in the treatment group in the Perinatology Room of RSUD Dr M. Zein Painan in 2019.

Table 4. Differences in mean pulse rate, respiratory rate and oxygen saturation between the treatment group and the control group

Variable	Group	N	Difference mean	SE	95% CI		p-value
					Lower	Uper	
Pulse rate	Treatment	8	6,625	0,972	4,503	8,747	0,000
	Control	8					
Breathing frequency	Treatment	8	4,875	1,172	2,279	7,471	0,002
	Control	8					
Oxygen saturation	Treatment	8	5,250	0,874	3,292	7,208	0,000
	Control	8					

The difference in the mean pulse frequency of the treatment group and the control group is 6.625 (Table 4). The results of statistical tests (independent T-test) obtained p- value = 0.000. This means that with the p-value of 0.05, it can be concluded that there is a significant difference in the difference in pulse frequency in the treatment group and the control group in the Perinatology room of RSUD Dr M. Zein Painan in 2019. The difference between the average respiratory frequency in the treatment group and the control group was 4.875. The results of statistical tests (independent T-test) obtained p-value = 0.002. This means that with the p-value of 0.05, it can be concluded that there is a significant difference in the respiratory frequency difference between the treatment group and the control group in thePerinatology room of RSUD Dr M. Zein Painan in 2019. The difference in the average difference in oxygen saturation in the treatment group and thecontrol group is 5.250. The results of statistical tests (independent T-test) obtained p-value = 0.000. This means that with the p-value of 0.05, it can be concluded that there is a significant difference in oxygen saturation in the treatment group and the control group in the Perinatology room of RSUD Dr M. Zein Painan in 2019.

4. DISCUSSION

Based on the results of the study,there were differences in the mean pulse frequency, respiratory rate and oxygen saturation in the treatment group and the control group. The results of statistical tests (independent samples T-test) obtained p-value = 0.000. This means that with the p-value of 0.05, it can be concluded that there is a significant difference in the difference in mean pulse frequency, respiratory rate and oxygen saturation in the treatment group and the control group in the Perinatology room of RSUD Dr M. Zein Painan in 2019.

This study is in line with research conducted by Bayuningsih entitled "Effectiveness of the use of nesting and prone position on oxygen saturation and pulse rate in premature infants at the Regional General Hospital(RSUD) in Bekasi City". value 0.001 (p < 0.005) so that there is a difference in oxygen saturation after nesting and prone position in LBW infants in the treatment group and the control group.[8]

Another study conducted by Utami with the title "The effect of the application of developmental care on physiological stress in LBW in the Perinatology Room of Panti Waluyo Hospital Surakarta". Based on the results of the Mann-Whitney statistical test, the p-value was obtained from 0.000 <0.05 so that there were differences in pulse rate and oxygen saturation after developmental care in the control group and the treatment group.[9]

According to Bobak, the efforts of environmental management in developmental care that are effective and easy to do by nurses in the perinatology room are nesting techniques that can facilitate the development of LBW infants in the form of physiological and neurological conditions. Provision of nesting or nest to accommodate excessive movement and give the baby a comfortable place.[5]

According to the theory expressed by Levine that the success of achieving integration is highly dependent on individual adaptation and conservation coping. Adaptation is the process by which LBW infants maintain their integrity in environmental reality which is a response to environmental changes. Individual response to a condition is very unique from one individual to another, both physiologically and physiologically.

According to the researcher's assumption, the significant difference in the mean pulse rate, respiratory rate and oxygen saturation in the treatment group and the control group indicatesthat the nesting technique is one of the effective non-pharmacological treatments. Nesting can reduce physiological stress in LBW infants such as increased pulse rate, increased respiratory rate and decreased oxygen saturation. Where nesting can be done easily, at no cost, is safe and has no side effects.

In the control group, 8 respondents from the treatment group experienced changes in physiological stress because the baby got a comfortable position in nesting. Where the nesting technique is oval and resembles conditions in the mother's womb. So that the baby can adjust or adapt to the environment outside the womb after hair. Then the nesting that is installed around the baby and the baby's flexion position makes the baby not expend energy that is still needed by the body. So that it can reduce physiological stress in LBW infants. In the control group, there were no physiological changes in the pulse rate, respiratory rate and oxygen saturation control group. This happens because there is no developmental care approach such as nesting which can be done by creating a comfortable atmosphere. Where LBW babies do not get a comfortable care environment. So that the baby's adaptation to the environment outside the womb does not increase.

5. CONCLUSION

There is a difference in the mean pulse frequency, respiratory rate and oxygen saturation in LBW infants in the treatment group and the control group in the Perinatology room of RSUD Dr M. Zein Painan in 2019.

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