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Effectiveness Of Use Of Nesting On Body Weight, Oxygen Saturation Stability, And Breath Frequency In Prematures In Nicu Room Gambiran Hospital Kediri City

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ABSTRACT
Premature births are responsible for two-thirds of infant deaths due to lack of good adaptability to extrauterine life so that the prospects for the survival and health of infants are greatly threatened. *Nesting* is an innovation used in the NICU room made of baby swaddling cloth that is rolled up in such a way that is then positioned around the baby's body like a condition in the mother's womb. This study aims to determine the effectiveness of the use of *nesting* 5 and 7 days in maintaining the stability of oxygen saturation, breathing frequency and body weight in premature infants in the NICU Room at Gambiran City Hospital in Kediri. This study used aapproach *quasi- experimental* with *pre-post test group design* in the NICU Room at Gambiran City Hospital in Kediri for the period 1 May 2019 to 31 July 2019. The population was 30 preterm infants. With *purposive sampling technique*, there were 14 samples of preterm infants. Group 1 consisted of 7 infants performed *nesting* for 5 days and group 2 consisted of 7 infants performed *nesting* for 7 days. Data normality test uses the *Kolmogoro-Smirnov Test*. *Independent t test is* used to test the effectiveness of using *nesting* on oxygen saturation, respiratory frequency stability and premature baby's weight. The results of the study in both groups $p < \alpha$ (0.05), then H_0 is rejected and H_1 accepted. So it can be concluded that the use of *nesting* in premature babies is effective in stabilizing body weight, oxygen saturation, the frequency of breathing of premature babies.

Keywords: Premature, *Nesting on* body weight, Oxygen saturation, Breath frequency**.**

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BACKGROUND

Preterm birth is responsible for two-thirds of infant deaths. Preterm or premature is defined as birth before 37 weeks' gestation, regardless of body weight (Bobak, 2015). Premature babies do not have the ability to adjust well to extrauterine life and the prospect of babies to have good survival or health can be severely threatened. The World Health Organization (WHO) states that babies born weighing less than 2500 grams and born after 37 weeks' gestation have better prospects for life than those born prematurely. LBW mortality is less than 5% if the pregnancy lasts until the age of term (Bobak, 2015).
Problems that often occur in premature babies include being born with a low birth weight of less than 2500 grams, as compensation for the lack of fat reserves. Babies who are born full term will experience a weight loss of around 5−10% in the first 7 days. Peak weight loss occurs on the second day after birth. Research conducted by Davanzo et al explains that weight loss of 8% is the top safe limit for newborn weight loss. If weight loss is ≥8%, it can increase the risk of mortality and morbidity in infants, such as hyperbilirubinemia and dehydration due to hypernatremia.
Based on East Java's health profile in 2016, 20,836 babies were born with a body weight <2500 g out of 580,153 baby births, or around 3.6%. In Kediri City, 127 babies were born with low birth weight from 4,324 babies born that year.
The number of low birth weight babies treated during the last three months in the Neonatus room at Gambiran City Hospital in Kediri (September - November 2018) obtained 98 data, with birth weight <2500 grams, 36 of them were treated in the NICU room and 15 of them died due to various complications (Medical Record, 2019).
Premature babies are also very susceptible to hypothermia due to thin fat reserves under the skin and immature heat control centers in the brain (Zaviera, 2012). The hypothermic condition causes permanent central nervous system changes which eventually lead to mortality. Chilled babies spend calories to warm the body and vice versa make an effort to stabilize body temperature to normal. Hypothermia conditions cause increased oxygen consumption and if not fulfilled causes a hypoxic situation and causes tachycardia or bradycardia in response to decreased oxygenation. In premature neonates, the quantity of fluid loss through evaporation of the skin and respiratory tract is higher than in neonates born at term. In addition, neonates born prematurely have a greater extracellular component, leading to greater diuresis in premature neonates. This is what causes neonates born prematurely to experience a higher weight loss than neonates born at term. Whereas in neonates born less months, the decline can occur up to 15%. Physiological weight loss does not occur after neonates aged 5-7 days and body weight increases at 12-14 days (Rahardina, 2015).
Respiratory problems are one of the causes of death in babies born prematurely. Respiratory problems in infants are often associated with the condition of Respiratory Distress Syndrome (RDS), also called hyaline membrane disease (HMD), is the most common cause of morbidity and mortality in low birth weight infants that is often caused by prematurity. RDS incidence of about 5-10% is found in infants less than 50 months, 50% in babies weighing 500-1500 grams (Nur, 2010).
Interview with nurses from the NICU Room at Gambiran City Hospital in Kediri, obtained information that the use of nesting was done prematurely. *Nesting* is the use of tools shaped like a condition in the mother's womb made of linen and can be adjusted to the length of the baby's body. This tool is placed as a protector of the baby's position, maintaining changes in the baby's position caused by gravity. *Nesting* is one of the nursing

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interventions in giving the right position for neonates. *Nesting* can facilitate the development of premature babies in the form of physiological and neurological conditions. *Nesting* is a buffer in the sleeping position of the baby so that it stays in a position of flexion, this is intended to prevent drastic changes in the position of the baby that can result in loss of energy from the neonate's body.

Based on the above phenomenon, researchers are interested in conducting further research on "Effectiveness of Nesting Use on body weight, oxygen saturation stability, and breathing frequency in premature infants in the NICU room at Gambiran City Hospital in Kediri".

OBJECTIVE

This study aimed to determine Effectiveness of Nesting Use on body weight, oxygen saturation stability, and breathing frequency in premature infants in the NICU room

METHODS

Methods Themethod used is *quasi- experimental* withapproach *one group pretest posttest*. The sample in this study was a portion of premature infants who were in the NICU room at Gambiran City Hospital in Kediri for 1 month that met the criteria of premature babies with birth weight> 1500-2500 grams, who did not have respiratory disorders, babies who did not undergo surgery, were treated in incubator, premature babies who do not have central nervous system damage and do not experience congenital abnormalities. Sampling uses a purposive sampling technique. The implementation time is on May 1 to July 31, 2019. The instrument used to take the Oxygen Saturation variable is oximetry with a normal SPOindicator$_2$ 88-95%, the breath frequency variable uses a stethoscope with a normal RR indicator: 30-60x / min, the Weight variable Agency uses Infant scale digital instruments. Nesting was given for 30 minutes per day for 5 days in groups 1 and 7 days in group 2.

RESULTS

Characteristics of Respondents

This study sampled 14 premature infants treated in the NICU Room at Gambiran City Hospital in Kediri during the period of May 1 2019 to 31 July 2019. The characteristics of the respondents are then presented in the form of the following table.

Table 1 Characteristics of Respondents by Age of Pregnancy

Age of Pregnancy (weeks)	Grup	n	%
29 - 31	Group 1	2	14.23
	Group 2	3	21.47
32 - 36	Group 1	5	35.71
	Group 2	4	28.57
Total		14	100

Source: Primary Data, 2019

Based on the above table, most respondents were born with 32-36 weeks' gestation. Namely 35.71% in group 1 and 28.57% in group 2.

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Table 2 Characteristics of Respondents by Birth

Weight (grams)	Birth	Grup	Total n	%
1500 - 1999		Group 1	2	14.23
		Group 2	4	28.57
2000 - 2500		Group 1	5	35.71
		Group 2	3	21.49
Total			14	100

Source: Primary data, 2019.

Based on table 2 above, most respondents were born with a body weight of 2000-2500 grams. Namely 57.2%., Where group 1 contributed 35.71% and group 2 contributed 21.49%.

Table 3 Characteristics of Respondents by Gender

Variable		Men	%	Women	%
Gender	**Group 1**	3	42.86	4	57.14
	Group 2	2	28.57	5	71.43

Source: Primary data, 2019.

In table 3 it can be seen that the number there were more female respondents in each group than male respondents, which was 57.14% in group 1. While in group 2 there were 71.43% respondents were female.

Table 4 Equality of Research Respondents by Pregnancy Age

Characteristics Variable		n (%)	*Mean*	*Median*	SD	Min-max	P-*value*
Pregnancy Age	Group 1	7 (50)	33	33	1.88	29-35	0.272
	Group 2	7 (50)	33	33	2.03	29-35	

Source: Primary data, 2019.

Based on table 4, the mean gestational age in group 1 and group 2 was 33 weeks. The results of the normality test data using the *Kolmogorov-Shmirov Test*, obtained gestational age is equivalent to p *value* > 0.05 which means there is equality at the gestational age of the two groups. *The mean* and *median* in the two groups were the same, ie 33 weeks, which means the data distribution is normal.
Based on these data the researchers concluded that there was equality in group 1 and group 2. Where group 1 was the baby to be *nested* for 5 days and group 2 was *nested* for 7 days.

Characteristics of Variables

Characteristics of each variable studied are oxygen saturation, respiratory frequency and body weight measured values include mean, median and mode aimed at determining the normality of the data. The data normality test uses the Kolmogorov-Smirnov Test.

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Table 5 Analysis of Oxygen Saturation Data, Respiratory Frequency and Weight of Premature Babies Before Using *Nesting*

Variables		*Mean*	*Median*	*Mode*	SD	P *value*
Oxygen Saturation	Group 1	91.14	90	90	1.96	0.755
	Group 2	91	90	90	1.51	
Respiratory Frequency	Group 1	64 , 43	65	65	2.38	0.85
	Group 2	64	64	64	1.6	
Body Weight	Group 1	1977.14	2010	2010	206.31	0.177
	Group 2	1968.57	1950	1950	203.73	

Source: Primary data, 2019.

In the table 4.5 found the average oxygen saturation prior to the installation of *nesting* in group 1 was 91.14% and group 2 was 91%. Equivalence test results found that the oxygen saturation of the two groups is equivalent to p *value* > 0.05. Thevalues are *modethe* and *median* same meaning the data distribution is normal.
The mean respiratory frequency before *nesting* in group 1 was 64.43x / min and was 64x group 2/ min. Both groups have the same *mean* and *median* mean the data distribution is normal. Equivalence test results p *value* > 0.05.
The mean weight before *nesting* in group 1 was 1977.14 grams and group 2 was 1968.57 grams. Both groups have the samevalues *mode* and *median* meaning the data distribution is normal. Equivalence test results found that the weight of the two groups is equivalent to p *value* > 0.05.

Table 6 Analysis of Oxygen Saturation Data, Respiratory Frequency and Weight of Premature Babies After Using *Nesting*

Variable		*Mean*	*Median*	*Mode*	SD
Oxygen Saturation	Group 1	93.42	93	93	1.29
	Group 2	95.71	96	97	1.27
Respiratory Frequency	Group 1	58, 14	59	59	2.59
	Group 2	53.43	52	52	2.06
weight	Group 1	1992.86	2020	2020	206.72
	Group 2	1997.14	1970	1970	203.88

In table 6 was found to mean oxygen saturation after the installation of *nesting* on group 1 was 93.42% and group 2 was 95.71% ,. The difference in mean increase in both groups was 2.29%, whereas in group 2 the increase in saturation was more significant than in group 1. The mean respiratory frequency after *nesting* in group 1 was 58.14 x / minute and

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group 2 was 53.43x / minute. In group 2 there was a better respiratory deceleration with a difference of 4.71 x / min from group 1. The mean weight after *nesting* in group 1 was 1992.86 grams and group 2 was 1997.14 grams. Group 2 experienced an increase in the mean more than group 1 by 4.28 grams.

Statistical

Tests Testing the normality of the data in this study using the *Kolmogorov-Smirnov test*, where the normality test is a requirement or assumption of the parametric test.

This study uses an *independent test*, which is a comparative test to find out whether there are significant differences in mean or average between two free groups that have interval or ratio data scales where the source of data comes from different subjects. In this study an *independent t test was* used to test the effectiveness of using *nesting* on oxygen saturation, respiratory frequency stability and body weight of premature infants. This test is used to determine the p *value* (probability value) of each variable tested.

Table 7 Effectiveness ofUse *Nesting* on Oxygen Saturation in Premature Babies

Oxygen Saturation Variables		***Mean***	**SD**	**P *value***
Group 1	Before	91.14	1.96	0.001
	After	93.42	1.29	
Group 2	Before	91	1.51	0.001
	After	95.71	1.27	

Source: Primary data, 2019.

In table 7 it appears that in both groups there was a significant increase in mean oxygen saturation. In group 1 before the average oxygen saturation action 91.14% to 93.42%. Group 2 before the average oxygen saturation action 91% to 95.71%. In both groups the results count p (0.001) <α (0.05), then H_0 is rejected and H_1 accepted. So it can be concluded that the use of *nesting* effectively maintains oxygen saturation in premature babies.

Table 8 Effectiveness ofUse *Nesting* on Respiratory Frequency in Premature Babies

Breathing Frequency Variables		***Mean***	**SD**	**P *value***
Group 1	Before	64.43	2.38	0.002
	After	58.14	2.59	
Group 2	Before	64	1.6	0.000
	After	53.43	2.06	

Source: Primary data, 2019.

In table 8 it appears that in both groups there was a significant decrease in the average respiratory frequency. In group 1 prior to the mean respiratory frequency 64.43 x / minute decreased to 58.14 x / minute with p *value* 0.002. Group 2 before the average respiratory frequency of 64 x / min fell to 53.43 x / min, with a p *value of* 0,000. In both groups the results count p (0.002) <α (0.05), then H_0 is rejected and

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$H_{1\ accepted.}$ So it can be concluded that the use of *nesting is* effective in reducing respiratory frequency in premature babies.

Table 9 Effectiveness ofUse on *Nesting* Premature Baby Body Weight

Variable Weight		*Mean*	SD	P *value*
Group 1	Before	1977.14	206.31	0.001
	After	1992.86	206.72	
Group 2	Before	1968.57	203.73	0.000
	After	1997.14	203, 8	

Source: Primary data, 2019.

Table 9 shows that in both groups there was a significant increase in body weight. Where group 1 before the average weight of 1977.14 grams increased to 1992.86 grams with a p *value of* 0.001. Whereas Group 2 before the mean weight action of 1968.57 grams increased by 28.57 grams to 1997.14 grams, with a p *value of* 0,000. In both groups the results count p (0.001) <α (0.05), then $H_{0\ is}$ rejected and $H_{1\ accepted.}$ So it can be concluded that the use of *nesting* in premature babies is effective in increasing body weight.

DISCUSSION

Effect ofUse *Nesting* 5 and 7 Days Against Oxygen Saturation in Premature Babies

Based on table 7 an increase in the average oxygen saturation after the use of *nesting*. In the group performed *nesting* for 5 days there was an increase in the average of 2.28% and in the group carried out *nesting* for 7 days the mean increased by 4.71%.

This is in accordance with the theory that states that the exact position and anatomical is an important component in the care of the development of premature babies (Bowden, et al. 2000). *Nesting* functions as a support for the baby's body so that there is no drastic change in position in the baby that can result in a lot of energy loss. Can also prevent the incidence of hypoxia due to hypothermia or due to incorrect position which results in difficulty breathing (Zubaidah, 2012). So that oxygen saturation can be maintained within the normal range.

Stress is closely related to cortisol production which can reduce oxytocin production which affects parasympathetic control in the cardiorespiratory system (Zahra, et. Al., 2018). Babies use *nesting* as a support for sleep to stay in a flexed position. This position facilitates the baby to feel relaxed and not stressed due to changes in conditions outside the uterus, thereby reducing the frequency of breathing and increasing oxygen saturation.

In this study thegroup *nesting* for 7 days showed better oxygen saturation results than thegroup *nesting* for 5 days. This can be realized, with increasing age of the baby, the baby's ability to adapt to the environment also improves. Nevertheless, *nesting* facilitates the development of premature babies in suppressing stress byan environment based on *developingdevelopmental care* that supports the development of physiological conditions.

Effect ofUse *Nesting* 5 and 7 Days Against Respiratory Frequency in Premature Babies

Based on table 8 there was a decrease in the average respiratory frequency in both groups after nesting. In the group that was*nesting* for 5 days there was a decrease in the average respiratory frequency by 3.71 x / minute, whereas in thegroup *nesting* for 7 days there was a decrease in the average respiratory frequency which was more by 10.57 x / minute.

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The results of this study are consistent with the theory that the baby's position affects the amount of energy expended by the body. The best position for premature babies is to do a flexion position because it will reduce metabolism in the body (Bowden, et. Al, 2000). The use of *nesting* facilitates the baby in maintaining a flexion position, namely by supporting the baby's body so that it is in the right and comfortable position. In babies with oxygen support, *nesting* helps maintain a position so as to maximize therapeutic delivery.

Premature babies have a very thin layer of subcutaneous fat, so hypothermia is easy and oxygen demand will be greater (Wong, et. Al., 2009). This is consistent with research conducted by Bayuningsih (2011), that *nesting is* able to maintain a warm body temperature so as to prevent respiratory stress due to hypothermia. *Nesting* is an environmental management method similar to KMC (*kangaroo mother care*) in infants whose conditions do not meet the KMC requirements.

The decrease in respiratory frequency is because the baby is calmer and increases sleep when *nesting*. It also shows a decrease in the stress level of infants due to deceleration of the body's cortisol level. Mooncey et al's research indicates that cortisol levels decrease by as much as ± 60% affecting the limbic area of the insular cortex in the brain, then resulting in the production of oxytocin which can calm and stabilize the cardiorespiratory system. When *nesting*, the baby is altered in a position so that it is not always in the supine position which can increase diaphragm compression. Infants are positioned flexibly so as to optimize the functioning of the baby's respiratory system (Zahra, et. Al., 2018).

The results showed that preterm infants undergoing nesting showed a more significant respiratory frequency deceleration than the first group. This can be influenced by the maturity of premature baby organs which is increasing. Nesting in this case helps to condition the baby's environment so that it remains conducive so that the energy it has can be maximized to support the development of premature babies so that it is faster in achieving optimal health conditions.

Effect of Nesting Use 5 and 7 Days Against Premature Baby Weight

Based on the results of the analysis in table 9 there was an increase in the average weight in both groups after nesting. In the nesting group for 5 days there was an average increase of 15.72 grams. In the nesting group for 7 days the average was 28.57 grams.

The baby's weight carried out by nesting longer showed better results, this is because the nesting method has a positive effect on maintaining the baby's weight (Anderson et al, 2003). The use of nesting intervention is done with the hope to maintain the energy released by the baby's body so that it is used optimally for growth and development. The researchers analyzed a number of studies, including concluding that nesting can reduce energy expenditure, accelerate emptying of stomach contents, increase nutrient absorption thereby reducing the incidence of significant weight loss.

Nesting is able to keep body temperature warm so as to prevent hypothermia (Bayuningsih, 2011). Warm ambient temperature in premature babies is needed for the efficiency of metabolism or the conservation of body energy as measured by calorie measurement (Zahra, et. Al., 2018).

Researchers also analyzed that the increase in baby's weight was influenced by several factors one of which was the baby's ability to absorb nutrients given both orally and parenterally. In premature babies who are cared for separately from their mothers, this

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nesting treatment is expected to be able to control stress that is exposed due to differences in extrauterine conditions.

Physiologically, infant weight gain is also influenced by the age of the baby, where babies tend to lose significant weight. Babies do not lose more than 10% of weight on the 5th day of birth. In neonates born less months, a decrease can occur up to 15% (Rahardina, 2015).

The use of this nesting can help the baby in stabilizing the physiological functions of the body's metabolism by preventing stress, the baby in a pleasant position like conditions in the womb. As explained in previous research by Bayuningsih (2011), although in the study the changes that occurred were not significantly explained.

CONCLUSION

An increase in mean oxygen saturation significantly in both groups after nesting. Increased oxygen saturation was higher in the nesting treatment group for 7 days (4.71%) compared to the nesting treatment group for 5 days (2.28%).

There was a decrease in the average respiratory rate in both groups after nesting. The group that was placed nesting for 7 days (10.57 x / min) showed a mean deceleration of respiratory frequency that was more significant than the nesting group 5 days (3.71 x / min).

There was an increase in the weight average in both groups. The 7-day nesting treatment group experienced an increase in body weight more than 15.72 grams compared to the nesting treatment group for 5 days, which was 28.57 grams.

In both groups the results of the p value (p value) variable oxygen saturationbefore and after the action obtained (0.001) $<\alpha$ (0.05), then H0 is rejected and H1 is accepted. So it can be concluded that the use of nesting effectively maintains oxygen saturation in premature babies.

In both groups the results of calculating the p value (p value) variabel respiratory frequency before and after the action obtained p (0.002) $<\alpha$ (0.05), then H0 is rejected and H1 is accepted. So it can be concluded that the use of nesting is effective in reducing the frequency of breathing in premature babies.

In both groups the resultl calculated the value of p (p value) weight variable before and after the action obtained p (0.001) $<\alpha$ (0.05), then H0 is rejected and H1 is accepted. So it can be concluded that the use of nesting in premature babies is effective in increasing body weight.

The nesting treatment group for 7 gave more significant results than the nesting treatment group for 5 days.

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