

Original Article

Effectiveness Of Polyethylene on Hypothermic Events in Low Birth Weight

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ARTICLE INFO

Article History:
Submit, 10 May 2021
Revised, 21 May 2021
Accepted, 29 May 2021
Available online, 30 June 2021

Keywords:

Polyethylene, hypothermia,
LBW

ABSTRACT

Background: Treatment of low-birth-weight babies so far has mostly used incubators and swaddled babies using cloth whenever possible using the kangaroo method. While the kangaroo method can be done if the mother and baby are both stable. Another way that can be done is to use a polyethylene blanket. The purpose of this study was to determine the use of polyethylene on the incidence of hypothermia in LBW.

Methods: This type of research is a quasi-experimental design with Pre-Posttest Only Control Design, a sample of 60 LBW infants was taken by means of Systematic Random Sampling. Data collection techniques using the method of observation. Statistical analysis using the General Linear Model with a significant level of : 0.05

Results: The results obtained in this study are based on the overall analysis obtained p-value $0.000 < 0.05$, it can be interpreted that giving blankets polyethylene to respondents is effective in increasing the temperature of infants and reducing the incidence of hypothermia. Furthermore, the results of research based on Partial Eta analysis can be seen that blankets made of polyethylene increase the body temperature of low-birth-weight babies by 91.1%, while the increase in the kangaroo method group with Partial Eta 0.861 by 86.1%.

Conclusion: This means that the use of blankets made from polyethylene increases the temperature higher than the kangaroo method.

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Haryoso, H. (2021). Effectiveness Of Polyethylene on Hypothermic Events in Low Birth Weight. *Journal of Applied Nursing and Health*, 3(1), 8-14. <https://doi.org/10.55018/janh.v3i1.19>

Introduction

According to the Indonesian Ministry of Health, low birth weight babies are babies born with a birth weight of less than 2500 grams regardless of gestational age. Classification of low birth weight babies, namely low birth weight babies 1500-2500 grams, very low birth weight babies <1500, while babies with extreme low birth weights <1000 grams (Prawirohardjo, 2009).

The infant mortality rate (IMR) in Central Java Province in 2015 was 10 per 1,000 live births. the biggest cause of infant mortality rate is LBW by 40,14%. The number of Low Birth Weight Babies in Magelang Regency in 2016 was 4.8%. The results of the preliminary study at RST dr. Soedjono Magelang obtained the number of low birth weight babies (LBW) 315 babies in 2015. Low birth weight babies are very susceptible to various problems such as metabolic disorders including hypothermia, impaired immunity, and



respiratory disorders. Hypothermia causes constriction of blood vessels, resulting in hypoxemia and continues with death (Proverawati & Rahmawati, 2010).

The method that has been used to treat low birth weight babies with hypothermia is the kangaroo method. The Kangaroo Method is a treatment for premature babies or low birth weight babies by direct contact between the baby's skin and the mother's (skinskin to skin). It is carried out in two ways, namely continuously (continuously within 24 hours) and intermittently with a short period of time, carried out when the mother visits (Amelia et al., 2021; Dewi et al., 2015; Nurlaila, 2017; Saputri, 2015).

The kangaroo method has various obstacles where mothers who are not healthy after giving birth cannot be optimal in doing the kangaroo method. Another method to keep the baby's body temperature normal at birth is to use a plastic bag immediately after the baby is born (Amelia et al., 2021; Hastuti, 2018; Nurlaila, 2017). Polyethylene (PE) is a material that belongs to the polymer group, or better known by another name plastic because the material is thermoplastic. If Polyethylene (PE) is irradiated, then the material will experience a change in its structure, which in general will change its physical properties (Mitayani, 2009; Smeltzer & Bare, 2014). The most prominent change in physical properties is the formation of cross-links. The method using Polyethylene (PE) can be used to wrap newborns, especially low birth weight babies (Merdekawati, 2017; Purwandari et al., 2019). Alicia's (2013) study on plastic bags to prevent hypothermia in preterm and LBW infants showed that as many as 104 babies, at 1 hour after birth, babies randomized to put in plastic bags had temperatures in the normal range compared to babies in the thermoregulatory standard care group

(Mubarak et al., 2013). The results of the study by Lenchen et al., showed that low birth weight babies who were put in plastic bags had no side effects (burning skin, infection, and hyperthermia).

Method

This research is a quasi-experimental type of research with the design used is Pre-Posttest Only Control Design. In this study, the researcher used the technique of Systematic Random Sampling to meet the specified number of samples. The samples used were 60 samples with 30 samples blanket polyethylene and 30 samples treated kangaroo method (Nursalam, 2013).

Data collection techniques used medical records to determine inclusion or exclusion groups and also data directly obtained from sources or respondents from measurements of the baby's axillary temperature which was measured before and after wrapping methods using blankets polyethylene and kangaroo methods. The analysis used univariate and bivariate, univariate analysis and multivariate analysis. In this study, researchers observed an increase in temperature in LBW infants who in group 1 were treated with blankets polyethylene and in group 2 were treated with the kangaroo method. Researchers also examine the characteristics that can affect both, namely the characteristics of sex and weight.

Bivariate analysis in this study aims to see the relationship between the independent variables, namely the use of blankets polyethylene and the kangaroo method on the body temperature of LBW. In this bivariate analysis, the researchers examined the average temperature rise in the two groups and the difference in the time of temperature rise produced by the two groups. Univariate analysis in this study is to see the effect between the

independent variables, namely using a blanket made of.

Results

Based on the results of univariate analysis related to the characteristics of respondents, the following results were obtained:

Table 1 Details of each characteristic of respondents in this study can be seen in the following table:

Name of Variable	N	Polyethylene Blanket		Kangaroo Method		X2	P
		N	%	N	%		
Characteristics							
Gender	Male	17	56.7	11	36.7	0.243	0.612
	Female	13	43.3	19	43.3		
BB Birth	LBW	17	60.0	11	36.7	0.002	0.728

Respondents' characteristic data for birth weight on Blankets were the *Polyethylene* majority in the LBW category, namely 16 (53.3%) for the majority kangaroo group LBW 17 (60%). Data on the characteristics of respondents on the respondent's birth weight has a distribution of data from each homogeneous group with a p-value of 0.728. Aims to see the relationship between the independent variables, namely the use of blankets *polyethylene* and the kangaroo method on the body temperature of LBW. Previously, the normality test was

carried out first. The results of the normality test using the Kolmogorov-Smirnov showed that the data were normally distributed with $p = 0.073 > 0.05$ before, 30 minutes $p = 0.079 > 0.05$, 60 minutes $p = 0.074 > 0.05$, it can be concluded that the data is normally distributed. therefore, the data were analyzed using the test *General Linear Model Mixed* (GLM-Mixed).

Table 4 Differences in LBW body temperature at 30 and 60 minutes in the two treatment groups

Group	N	F	P-value
Blanket	30		
<i>Polyethylene</i>		15.28	0.000
Kangaroo method	30		

Average body temperature of Low-Birth-Weight Babies at 30 and 60 minutes in the group using blankets made of *Polyethylene* and the kangaroo method based on pre-test and post-test scores.

Table 3. Average body temperature of LBW at 30 and 60 minutes in both treatment groups

Group	N	Before	30	Minutes 60
		Mean (SD)	Mean (SD)	Mean (SD)
Blanket	30	36.26	36.71	37.09
<i>Polyethylene</i>		(0.15)	(0.13)	(0.18)
Kangaroo method	30	36.33	36.52	36.91
		(0.16)	(0.12)	(0, 16)

Based on table 3 can be interpreted that the increase in the average temperature of group blankets made from *polyethylene* on a pre-test (36.26), being 36.71 at minute 30 and minute 60 to 37.09. This shows an increase in

body temperature Low Birth Weight Babies minutes to 30 and 60 in the group blankets made of *polyethylene*. An increase in the mean temperature occurred in the pre-test kangaroo group (36.33), to 36.52 at 30



minutes, and at 60 minutes to 36.91. This also shows that there is an increase in body temperature of Low Birth Weight Babies at 30 and 60 minutes in the group using the kangaroo method. Based on table 4 shows that there is a difference in body temperature between the blanket *polyethylene* and the kangaroo method on measurements before, 30 minutes and 60 minutes, with a value of $F=15.28$, sig 0.000 which is smaller than the value of $=0.05$. it means that there is an interaction between the time before, the 30th minute and the 60th minute in the two groups that are significantly different. A significant difference in the group using blankets made of *polyethylene* and the kangaroo method was at 60 minutes where there was a more significant increase in temperature in the group blankets made of *polyethylene* using than the kangaroo method.

Table 5 Analysis of General Linear Model Between-Subjects Effects on the two groups

Group	N	Partial Eta	P-value
Kangaroo Method	30	0.861	0.000
Blanket <i>Polyethylene</i>	30	0.911	0.000

Based on Table 5 shows that there is a difference in temperature between the blanket made of *polyethylene* in before the action, minute 30 and minute 60 with Partial Eta 0.911 means that a blanket made of *polyethelene* increase body temperature birthweight infants was lower by 91.1% whereas the increase in the group kangaroo method with Partial Eta 0.861 of 86.1%. This means that the use of blankets made from *polyethylene* increases the temperature higher than the kangaroo method. The relationship between external variables such as gender, birth weight on measurements before, 30 minutes and 40 minutes in both groups were analyzed using the *General Linear Model Mixed* (GLM-Mixed) with a significance of 0.05.

Table 6 Factors gender, LBW birth weight in both groups

Variable Name	N	Before Mean (SD)	Min 30 Mean (SD)	Min 20 Mean (SD)	Partial Eta	P
Gender	Male	36.33 (0.16)	36,67 (0.12)	36.88 (0.15)	0.148	0.006
	Female	36.22 (0.14)	36.48 (0.12)	36.23 (0.18)		
Birth	LBWLBW	36.29 (0,14)	36.65 (0.11)	36.95 (0.16)	0.016	0.732
	LBW	36.23 (0.17)	36.63 (0.12)	36.92 (0.20)		
	LBW	36.36 (0.15)	36.70 (0.18)	37.03 (0.16)		

Based on table 6 it can be interpreted that the measurement of body temperature is both pre-tests, post-test1, and post-test2. Statistical test results p value on the variable

Birth weight ($0.735 > 0.05$), From the results of the analysis it can be concluded that for factors birth weight has a p value > 0.05 , so it has no effect on LBW body temperature both



at and 60 minutes. Meanwhile, from the results of the statistical test p value the variable gender ($0.006 < 0.05$) it shows gender has an influence on the baby's body

temperature. This analysis used to see the effect of the independent variables, namely using a blanket made of *Polyethylene* and the kangaroo method.

Table 7 Multivariate analysis of independent variables and external variables on body temperature of Low Birth Weight Babies at 30 and 60 minutes

Variable	F	Partial Eta	P value
Blanket <i>Polyethylene</i> Kangaroo Method	18.284	0.017	0.000
Gender	12,456	0.211	0.002

Based on the table above, it can be interpreted that the use of blankets made from *Polyethylene* and Kangaroo Method have a significant effect on body temperature of LBW ($0.000 < 0.05$). While other factors that affect the temperature of LBW is the sex factor ($0.002 < 0.05$).

Discussion

In the results of research that has been carried out, the majority of the blanket group polyethylene were male, while the kangaroo method group were female. The increase in body temperature during the pretest to posttest both 30 and 60 minutes experienced an increase which was treated using a blanket made of Polyethylene.

Based on table 5.3 it can be interpreted that the increase in the average temperature of the group using blankets Polyethylene in the pretest (36.26) became 36.71 at 30 minutes, and at 60 minutes to 37.09. This shows an increase in body temperature Low Birth Weight Babies groups blankets made from polyethylene's increase in body temperature during the pretest to posttest both 30 and 60 minutes experienced an increase which was treated using a blanket made of Polyethylene (Harahap & Radityo S, 2017; Simamora, 2007; Tangke, 2021).

An increase in body temperature occurs after using a blanket made of Polyethylene. Polyethylene reduces the risk of heat transfer by convection because the

baby is wrapped in plastic which prevents heat loss that occurs in the baby when the baby is exposed to cooler ambient air where babies with low birth weight tend to have less subcutaneous fat (Campbell-Yeo et al., 2019; Kurt et al., 2020). by using polyethylene in LBW immediately after the baby is born increases the baby's body temperature, statistically, his body temperature is significantly different compared to babies who do not use plastic bags (Engler et al., 2002; Ludington - Hoe & Swinth, 1996). so that the use of blankets made of polyethylene is more effective in reducing the incidence of hypothermia.

Meanwhile, in the kangaroo method, the average temperature increase occurred in the pretest (36.33), to 36.52 at 30 minutes, and at 60 minutes to 36.91. This also shows that there is an increase in body temperature of Low-Birth-Weight Babies in the group using the kangaroo method. From the results of the study, it was found that there was an effect of the kangaroo method on the body temperature of babies with low birth weight.

Other studies have shown that caring for mother's skin to skin contact is very effective in preventing hypothermia in



preterm or low birth weight infants (McCall et al., 2007). So, this method of treatment is very beneficial, especially for low-birth-weight babies. The disadvantage of the kangaroo method is that it can be done if the mother and baby are both in a stable condition.

Conclusion

Conclusion of this study is that the average body temperature of Low Birth Weight Babies in the group using blankets made of Polyethylene and the kangaroo method increased before the action, 30 and 60 minutes. There were differences in body temperature of Low Birth Weight Babies at 30 and 60 minutes in the group. which uses a blanket made from Polyethylene and the kangaroo method. The use of blankets made of polyethylene increases the body temperature of low birth weight babies by 91.1% while the kangaroo method by

86.1%. Characteristics that affect the increase in body temperature of Low Birth Weight Babies is Gender. Based on the results of the study, conclusions and limitations of the study, it can be suggested: Another way to overcome hypothermia in low birth weight babies is to use blankets made of Polyethylene, the use of polyethylene blankets can be an alternative method that can be done to warm the baby's body temperature other than by using the kangaroo method. Excess use of blankets polyethylene This is can be done immediately, not waiting for the mother is stable after childbirth, but the use of this quilt should only be done under the supervision of medical personnel, use of blanket polyethylene in low birth weight babies more than two hours can cause hyperthermia so that during usage must be under the supervision of a health professional.

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