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Effectiveness of Horikosibagasi (Thermal Protection) Method toward Duration of Temperature Change and Body Temperature of Low-Birth weight Infant

Authors
Tri Wiji Lestari[1*], Titin Suheri[2], Lucia Endang Hartati[3]
Nursing Department, Poltekkes Kemenkes Semarang Jl. Tirto Agung, Pedalangan, Banyumanik, Semarang, Indonesia
*Corresponding Author
Tri Wiji Lestari
Email: *trilestari_68@yahoo.com*

ABSTRACT
Background: *Prevalence of birth clients with low birth weight tends to increase from year to year making the handling of infants with low birth weight needs an appropriate intervention including the treatment using the thermal protection step so that the babies can be saved.*
Objective: *The goal of this research is to know and analyze the effectiveness of horikobagasi method (thermal protection) on the time and body temperature of the baby*
Methods: *This study employed quantitative method with a quasi experiment using group pretest-posttest design with the statistic test of Mann Whitney .Population and sample of this research were forty baby born with body weight less than 2500 gram in general hospital of Semarang Indonesia during September until November 2016.*
Results: *The research got p-value equal to 0.00 or <0. 05 indicating there is a significant difference of temperature change between the control group and the group given the treatment of horikosibagasi method (thermal protection). Furthermore, the influence of the mode of harikobagasion the body temperature is 0.01or < 0. 05 indicating there is a significant difference in body temperature rise between the treatment group and the control group.*
Conclusion: *Treatment with the method of horikosibagasi (thermal protection) is quite sufficient to increase body temperature in low birth weight infants although when compared with using an incubator, it takes longer time in reaching normal temperature.*
Keywords: *Horikosibagasi method, time, body temperature, low birth weight infants*

Introduction

In Indonesia, attention to efforts to reduce neonatal mortality is essential because neonatal mortality contributes to 59% of infant deaths. The percentage of children under five (0-59 months) with low birth weight is 10% in Central Java Province (Kemenkes, 2015). Low birth weight babies if left untreated will cause problems in the short and long term. In low birthweightinfants, a lot of problems occur in the body system, starting from imperfect body temperature regulation, respiratory function, nerve function, cardiovascular function, bleeding system, digestive system, urinary system, and immune system. The biggest cause of premature infants and low-birth babies born with low weight, especially below 2000 grams is hypothermia, namely a decrease in body temperature below 36.5^0 C in addition to asphyxia and infection. Hypothermia is due to unfeasible temperature regulation centers due to insufficient brown fat or lack of brown fat, which results in reduced fat production.

Based on a preliminary study which the authors obtained from medical record installation of general hospital Semarang City on February 8, 2015, the prevalence of birth clients with low birthweight in January to December 2015 as many as 314 who undergo inpatient treatment. The death rate itself has increased from the year 2014 as much as 58 and in 2015 as much as 76. The number of these incidents due to the lack of fast and appropriate treatment in overcoming problems that will worsen the baby's prognosis. The prognosis will be worse when weight is lower; death is often caused due to neonatal complications such as asphyxia, aspiration, pneumonia, intra-cranial bleeding, hypoglycemia. This prognosis also depends on the state of the economy, parental education, and care during pregnancy, delivery, and postnatal care. Regulation of environmental temperature, resuscitation, food, infection prevention, respiratory, asphyxia, hyperbilirubinemia, hypoglycemia, hypothermia/hyperthermia and others).

A significant problem in low birth weight infants is in thermoregulation disorders so that the diagnosis is reported to be monitored or treated more frequently. According to Sudarti, low body temperature (hypothermia) can be caused by exposure to cold environments (low ambient temperature, cold or wet surfaces) or babies wet or unclothed. Therefore the maintenance of temperature or thermoregulation in infants with low weight is essential to prevent heat loss and complications such as death and disability. Keeping the baby temperature warm can be done either manually or nonmanual through themethod of *Horikobagas*i (thermal protection).

Materials and Methods

The type of research conducted was quantitative research with a quasi experimental design which aims to find out an effect that arises or causal relationship. The design used in this study was two groups Pretest-Posttest design, which is a model that performs treatment on two groups that are then observed before and after the intervention. The data were taken by first observation (pre-test). The researchers found out the preliminary data then the researcher noted the change that happened after the experiment/ intervention, while the control group did not get treatment or intervention and observed before and after. The location of data collecting in this research was in Semarang City General Hospital with independent variable was thermal protection, and dependent variables were the time & temperature of the body of the baby's weight. The study population was all low birth weight infants in the perinatology room observed from December to May 2016 with a sample size of 40 children. The research instruments used were observation sheet & questionnaire, baby scales, thermometer, Standards Operating Procedure (SOP) for low birth weight thermal protection. Because the data distribution was not normal, then the normality test employed Shapiro – Wilk test and then the data was tested by using Mann Whitney test.

Results and Discussions

A. Results

Table 1.Characteristic of treatment group (n=40)

	Mean	Median	Min	Max	SD	Variance
Length of treatment	87.55	90.00	65	110	10.957	120.050
Before treatment	34.29	34.50	32	35	0.823	0.678
Temperature change	2.71	2.50	2	5	0.823	0.678
Average increase	0.0310	0.300	0.02	0.06	0.010	0.000

Based on Table 1, the respondents in treatment group averagely take 87.55 minutes to reach a normal body temperature where the average body temperature of respondents before the treatment was 34.39 degrees. The average respondent experienced an increase in temperature as much as 2.71 degrees to reach the normal temperature. The fastest time the defendant needs to arrive at the normal temperature was 65 minutes, the mean time was 90 minutes, and the longest time required by the respondent was 110 minutes. The standard deviation of the treatment time is 10.957 with the variance of 120 which means that the time necessary for each respondent varies considerably. The lowest temperature before thermal protection in the treatment group was 32^0C, and the highest temperature was 35^0 C, with a standard deviation of 0.823. Furthermore, Table 1 showed that in the treatment group there was a change of temperature. Respondents experienced a temperature change of 2-5 ^{0}C with a standard deviation of 0.823. The average temperature rise in the treatment group was at least 0.02 and the highest 0.06 with a standard deviation of 0.010.

Table 2. Characteristic of control group (n=40)

	Mean	Median	Min	Max	SD	Variance
Length of treatment	41.82	39.00	30	70	11.640	135.484
Before treatment	34.88	35.00	34	36	0.474	0.225
Temperature change	2.12	2.00	1	3	0.474	0.224
Average increase	0.0540	0.06	0.03	0.09	0.1903	0.000

Table 2 shows the average control group respondents took time to reach the proper temperature for 41.82 minutes in which the fastest time to reach the normal temperature is for 30 minutes, at most 70 minutes with a standard deviation of 11.640. In preliminary testing of the control group, the lowest temperature was 34 ° C while the highest temperature was 36 ° C. This group experienced a temperature change of 1-3^0C to reach normal temperature. The average temperature rise in the control group was 0.040 with a standard deviation of 0.1903.

Table 3. Effect of Harikosibagasi Method (thermal protection) on the duration of temperature change

	N	Std. deviation	P- value
Treatment	20	10.957	0.00
Control	20	11.640	

Table 3 shows the results of the Mann-Whitney analysis test obtaining p-value of 0.00 or <0.05. The value of p-value less than 0.05 means that there is a significant difference in temperature change between the control group and the group was given the thermal protection treatment.

Table 4. Influence Harikosibagasi Method (thermal protection) to baby's body temperature

	N	Std. deviation	P- value
Treatment	20	0.823	0.010
Control	20	0.474	

Table 4 shows the p- the value of Mann Whitney test of 0.01. The value of p-value less than 0.05 means that there is a significant difference in body temperature rise between the treatment group and the control group.

Table 5. The result of comparison test of mean body temperature rise of treatment and control group

	N	Std. deviation	P-value
Treatment	20	0.01021	0.00
Control	20	0.1903	

Table 5 shows the p-value of the analysis test of 0.00 which means that there is a difference between the average of the treatment group's temperature rise and the control group.

B. Discussions

The results showed that infants who were respondents were babies born with body weight less than 2.500 grams, ranging from 1900-2450 grams regardless of age gestation.

In the 20 respondents, the average treatment group of respondents took 87.55 minutes to reach a normal body temperature where the average body temperature of the defendant before treatment was 34.39 degrees; the average respondent experienced an increase in temperature as much as 2.71 degrees to reach the normal temperature. The fastest time the defendant needs to arrive at the standard temperature is 65 minutes, the intermediate time is 90 minutes, and the longest time required by the respondent is 110 minutes. The condition resulted in relatively broad body surface, thinner subcutaneous body tissue, less brown fat, and juvenile body regulation center produced baby's body experiencing evaporation. Excessive exposure occurs with outside temperatures, so that heat production decreases and body temperature is unstable.

The results showed that the test results of Mann-Whitney analysis obtained the p-value of 0.00 or <0.05. The value of p-value less than 0.05 means that there is a significant difference of temperature change between the control group and the group was given the treatment of Harikosibagasi method (thermal protection). This occurs because the treatment provided by the Harikosibagasi method uses the steps taken in manual from start to prepare warm room temperature around 25^0C -28^0 C, dry out immediately, skin contact with mother's skin, early breastfeeding, do not bathe immediately, pack adequate clothes and blanket, do nursing, between baby and mother, and do transport/removal by paying attention to the warmth of baby. In the other hand, respondents served as the control group simply applied a regular habit that the patient was put into the incubator where the baby incubatoris used as a place of newborns. This equipment has an adjustable temperature according to the mother's body temperature of the newborn. Thus, this one equipment has a temperature sensor, heater and alarm system (buzzer). Heat setting can even be done easily just by pressing the selection button and displayed on the LCD. This contact is most effective to increase the temperature of the baby.

Based on the results, it can be seen that the significant p-value of the test analysis of 0.00 meaning there is a difference between the average increase in the temperature of the treatment group with the control group. This is also in line with Yunanto's that the major problem in infants with low birth weight is in thermoregulation disorders so that this diagnosis is monitored or treated more frequently. The failure of thermoregulation is generally due to the inability of the hypothalamus in performing its functions due to various causes. Intrauterine hypoxia/delivery / postpartum conditions, neurologic effects and prenatal drug exposure (analgesic/anesthetic) may suppress the neurologic response of the baby in maintaining its body temperature. Infants will have problems in temperature settings can suffer hyperthermia, and the most common problem of thermoregulation system disorders in infants with low birth weight is hypothermia.

Newborns have not been able to regulate their body temperature, so it will experience stress with the environmental changes from the mother's womb to the outside environment that the temperature is high. This cold temperature causes the amniotic fluid to evaporate through the skin, in a cold environment, the formation of temperature without the shivering mechanism is the baby's main effort to retain body heat. The structure of temperature without shivering is the result of the use of brown fat for heat production. Chocolate fat deposits are found throughout the body and can increase body heat to 100%. To burn brown fat, often babies should use glucose to get the energy that will turn fat into heat. This brown fat reserves will be exhausted in a short time in the presence of cold stress. The longer the pregnancy age, the greater the supply of baby brown fat. If a baby is cold, he/she will begin to experience hypoglycemia, hypoxia, and acidosis. Thus, efforts to prevent heat loss is a top priority and midwives are obliged to minimize heat loss in newborn babies to avoid hypothermia. The process of heat loss in infants can be through the process of convection, evaporation, radiation, and conduction. This can be prevented when babies are born in environments with temperatures of 25-28 ° C, dried and warmly wrapped.

Conclusion

Problems that occur in infants of low birth weight in Semarang city hospital is hypothermia (100%). For this research to be used for low birth weight infant management guidelines, it is necessary to disseminate to hospital institutions that the method of *Horikosibagasi* is one solution to the problem. The need for discipline of the nursing profession in implementing this method, is also necessary so that in the maximum results can be achieved. For the researchers, this is a preliminary study of this method, so it needs to be further developing for the management of low birth weight infants with hypothermia.

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