THE EFFECTIVENESS OF KANGAROO AND INCUBATOR CARE METHODS TO INCREASE BODY TEMPERATURE IN BABIES WITH LOW BIRTH WEIGHT

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ABSTRACT

Low Birth Weight (LBW) infants are at risk of experiencing various health problems. One of them that often occurs is an unstable body temperature and tends to be hypothermic. This study aims to determine the effectiveness of Kangaroo Method Care (KMC) and incubator treatment to increase body temperature in LBW infants. This study used a Quasi Experiment Design technique with a Pre-test and Post-test Group design. The sample in this study were all LBW infants according to the inclusion criteria, which were 30 babies. The sample was divided into two intervention groups, namely 15 infants with KMC intervention and 15 infants with nursing intervention in an incubator, which were given intervention for 2 hours per day for a period of 3 days. The sampling technique used in this study was purposive sampling. In the KMC group, the average pretest value was 36.59°C and the posttest value was 37.06°C. In comparison, in the treatment group of incubator intervention, the average pretest value was 36.4°C and the posttest value was 36.8°C. Based on the results of the independent sample t-test statistical test, the significance was 0.035, p <0.05. The results showed that the average of increasing infants’ body temperature in the intervention of KMC was 0.4640 (SD = 0.08998), while the average increase in infant body temperature in the incubator treatment was 0.3953 (SD = 0.07909). The application of KMC and treatment in the incubator are equally effective in increasing the body temperature of LBW.

Keywords: LBW, Kangaroo Method Care (KMC), Incubator Treatment, Body Temperature

INTRODUCTION

One of the causes of infant mortality rate (IMR) is the low birth weight (LBW). LBW is a condition of infant with a birth weight of fewer than 2500 grams who is weighed right after birth up to the first 24 hours. LBW infant has a greater chance of experiencing morbidity and mortality because the growth of the organs in the body is less than perfect (Hartiningrum and...
Fitriyah, 2018). One of the problems that occur in LBW is unstable body temperature and tends to be hypothermic (body temperature less than 36.5°C). Cold stress can increase mortality and inhibit growth.

In Indonesia, the incidence of LBW in 2018 was (6.2%). In previous years, the incidence of LBW has always increased. Based on Indonesian basic health research in 2018, (56.6%) of infants had a record with LBW, with the highest LBW rate occurring in Central Sulawesi Province at 8.9%, and the lowest LBW rate occurring in Jambi Province at (2.6%) (Kemenkes RI, 2018). Based on the data from the Pasuruan City Health Office in 2017, the percentage of newborns weighed was (97.30%) from 3,331 live births, LBW in Pasuruan City in 2017 was (3.73%) or it can be concluded that there were 121 LBW cases out of 3,241 newborns weighed. The percentage of LBW incidence has increased compared to 2016 (3.53%), 2015 (3.57%), and 2014 (3.5%). The results of a preliminary study conducted by researchers in the perinatology room of RSUD dr. R. Soedarsono Pasuruan City on September 10, 2019, the prevalence of LBW, including premature babies from June to August 2019, was 33 infants, with the treatment method used is kangaroo and incubator.

Interventions that can be given in terms of stabilizing the body temperature of LBW infants are using a swaddle if the treatment is carried out at home, incubator conventional care, and by using the kangaroo method of care (Kusumawardani and Sulistyanto, 2021). Prevention of hypothermia in LBW in the hospital is done by using an incubator, nonetheless we are faced with the problem of a shortage of skilled workers to be able to operate the incubator and also the cost of equipment maintenance and logistics. The use of incubators is also considered to inhibit early contact between mother and baby and inhibit early breastfeeding. It is often found that one incubator is used for more than one baby because of its limited equipment, this phenomenon merely increases the risk of nosocomial infections (Fernando et al., 2019).

The benefits of the kangaroo method of care include causing the baby's heart rate to stabilize and breathing more regularly so that the distribution of oxygen throughout the body becomes better. Babies can sleep soundly and longer, calmer, cry less, facilitate breastfeeding, strengthen the bond between mother and baby and shorten the treatment period between mother and baby (Heriyeni, 2018). The mechanism of KMC through many pathways, mediated through skin to skin, including thermal control, neuroendocrine mechanisms, neuro-endocrine mechanisms involving the release of oxytocin in the mother and neonate, reduced cortisol and stress response, cardio-respiratory stabilization, increased milk production, changes in neonatal microbiome with intermittent KMC has an influence on preventing infection (Brotherton et al., 2020).
So far, no research has been conducted to determine the effectiveness of LBW treatment using the Kangaroo and incubator methods for changes in body temperature in LBW in the Perinatology Room of RSUD dr. R. Soedarsono Pasuruan. This study aims to determine the effectiveness of kangaroo treatment and care in an incubator on increasing body temperature in LBW

**METHOD**

This research used a Quasi Experiment Design using a Pre-test and Post-test Group design. The population in this study were LBW infants who were treated in the Perinatology Room of RSUD dr. R. Soedarsono Pasuruan City. The population of LBW were infants who born from November 16, 2019 to December 31, 2019 which were 33 babies, with a large sample of 30 babies who were set by purposive sampling. Determination of a number of 30 based on the opinion of Alwi, (2015), that for comparative research requires 15-30 respondents for each group. This sample was divided into two groups, namely the KMC treatment group with 15 infants and the treatment group in the incubator with 15 infants. Inclusion criteria for gestational age <37 weeks, body temperature in the lower range/hypothermia (<36.5°C), vital signs pulse and respiration rate (RR) within normal limits (pulse: 90-160x/minute, RR: 30 -60x/minute), no congenital abnormalities (Congenital Heart Disease/CHD), no ventilator/CPAP (Continuous Positive Airway Pressure) and the family is willing to be a respondent. Specific criteria for the treatment group using the Kangaroo Method Care (KMC) were good reflexes and coordination of sucking and swallowing and healthy babies and mothers.

The criteria for the specific group in the treatment group in the incubator are babies in certain conditions according to doctor's recommendations requiring incubator care, babies with weight < 2000 grams, and mothers in conditions unable to do KMC. Exclusion criteria: in the implementation of the study the baby's condition became critical, the baby had a fever (body temperature > 37.5 C and the baby had problems with his mother (baby blues). Operational definition of the KMC variable: LBW care by placing the baby on the mother's chest (skin contact) baby and mother), the baby's position is upright or prone (when the mother is lying down), held between the mother's breasts and the baby's head facing the right or left. Caring for the baby in an incubator: LBW care by placing the baby in a bed equipped with a regulator temperature to maintain ambient temperature in infants. The definition of body temperature is: body temperature in infants measured on the forehead using a digital infrared thermometer which is carried out before and after the Kangaroo Method Care (KMC) and treatment in an incubator, after that the difference is seen which is stated in numbers Classification:
hypothermia (< 36.5 C), normothermy (36.5-37.5 C) and hyperthermia (> 37.5 C). Research instrument using kangaroo method care standard of operational procedure (SOP), baby care SOP in incubator, and digital infrared thermometer.

In the KMC treatment group, researchers measured the respondent's body temperature before the KMC intervention. This data was documented as KMC pretest data, then KMC intervention was carried out in the KMC treatment group for 3 consecutive days, with an intensity of 2 hours per day. After the third day of KMC, body temperature was measured and documented as KMC post-test data. In the treatment group in the incubator, the researcher measured the respondent's body temperature before the treatment in the incubator. These data are documented as pretest data for treatment in the incubator, treatment intervention was carried out in the incubator for 3 consecutive days, with an intensity of 2 hours per day. In the treatment group of incubator care, the researcher measured the respondent's body temperature after the treatment in the incubator. These data are documented as post-test care data in the incubator. The homogeneity test on the body temperature variable was used to determine the equivalence of variations between before and after the Kangaroo Treatment Method (KMC) and treatment in the incubator. Homogeneity test was used Levene test. The results of the homogeneity test showed p < 0.05, it means that there was a significant difference between the two groups so it was said that the group was not the same or not homogeneous. The bivariate test was used paired sample t-test in the PMK group and the treatment group in the incubator showed p <0.05, it means that there was a significant difference between the pretest and posttest data measurements in the two groups. The independent samples t-test for the KMC group and the treatment group in the incubator showed a significant result of 0.035, p < 0.05, it can be conclude that there was a significant difference in body temperature increase between the two groups.

This research has received ethical approval from Poltekkes Ministry of Health Malang No 521/KEPK-Polkesma/2020.

RESULTS

The characteristics of respondents in the PMK and Incubator treatment can be seen in Table 1 and 2.
Table 1 Characteristics of Respondents' Data in the KMC Group in the Perinatology Room of RSUD dr. R. Soedarsono Pasuruan City period 16 November 2019 – 31 December 2019

| Characteristics          | n= 15 | %  | Mean | Min | Max | Std. Deviasi |
|--------------------------|-------|-----|------|-----|-----|--------------|
| Infant Age               |       |     |      |     |     |              |
| 0 hari                   | 1     | 6,7 |      |     |     |              |
| 1 hari                   | 12    | 80,0|      |     |     |              |
| 2 hari                   | 1     | 6,7 | 1,13 | 0   | 3   | 0,640        |
| 3 hari                   | 1     | 6,7 |      |     |     |              |
| >3 hari                  | -     | -   |      |     |     |              |
| Gender                   |       |     |      |     |     |              |
| Laki-laki                | 9     | 60,0|      |     |     |              |
| Perempuan                | 6     | 40,0|      |     |     |              |
| Mother Age               |       |     |      |     |     |              |
| 15 – 20 thn              | 2     | 13,3|      |     |     |              |
| 21 – 25 thn              | 7     | 46,7|      |     |     |              |
| 26 – 30 thn              | 2     | 13,3| 26,00| 17 | 40 | 6,729        |
| 31 – 35 thn              | 3     | 20,0|      |     |     |              |
| 36 – 40 thn              | 1     | 6,7 |      |     |     |              |
| Gestational Age          |       |     |      |     |     |              |
| <28 mgg                  | -     | -   |      |     |     |              |
| 28 – 32 mgg              | 1     | 6,7 | 35,13| 31 | 36 | 1,407        |
| 32 – 34 mgg              | 1     | 6,7 |      |     |     |              |
| 34 – 36 mgg              | 13    | 86,6|      |     |     |              |
| LBW                      |       |     |      |     |     |              |
| 501 – 1000 gr            | -     | -   |      |     |     |              |
| 1001 – 1500 gr           | -     | -   | 2392 | 2200 | 2490 | 87,194     |
| 1501 – 2000 gr           | -     | -   |      |     |     |              |
| 2001 – 2500 gr           | 15    | 100 |      |     |     |              |
| Body Temperature         |       |     |      |     |     |              |
| 35,6 – 36,0°C            | -     | -   |      |     |     |              |
| 36,1 – 36,5°C            | 12    | 80  | 36,38| 36,1| 36,6| 0,1740       |
| 36,6 – 37,0°C            | 3     | 20  |      |     |     |              |

Table 1. Formatting rules

| Sample | X | f (%) | Y | f (%) | X | f (%) |
|--------|---|-------|---|-------|---|-------|
| 1st    | 2 | (1,06)| 30 | (16,3)| 16 | (20,2) |
| 2nd    | 1 | (0,38)| 40 | (51,4)| 55 | (75,7) |

Table 1 shows that the characteristics of LBW in the KMC group based on the baby's age obtained the mean of 1.13 or 1 day, with a standard deviation of 0.64. Gender characteristics were dominated by male sex with 9 babies (60%). The characteristics of the mother's age are dominated by ages between 21-25 years with 7 mothers (46.7%). The most characteristic of LBW gestational age was 34-36 weeks' gestation with 13 babies (86.6%). Characteristics of BBL respondents obtained an average (mean) of 2392 grams, with a standard deviation of...
87,194. And the characteristics of the respondent's body temperature obtained an average (mean) of 36.38°C, with a standard deviation of 0.1740.

### Table 2 Characteristics of Respondent Data

The treatment group in the incubator in the Perinatology Room of RSUD dr. R. Soedarsono Pasuruan City period 16 November 2019 – 31 December 2019.

| Characteristic | n= 15 | %  | Mean | Min | Max | Std. Deviasi |
|---------------|-------|----|------|-----|-----|-------------|
| **Infant Age** |       |    |      |     |     |             |
| 0 hari        | 10    | 66,7 |      |     |     |             |
| 1 hari        | 4     | 26,7 |      |     |     |             |
| 2 hari        | -     | -    | 0,73 | 0   | 7   | 1,792       |
| 3 hari        | -     | -    |      |     |     |             |
| >3 hari       | 1     | 6,7  |      |     |     |             |
| **Gender**    |       |    |      |     |     |             |
| Laki-laki     | 8     | 53,3 |      |     |     |             |
| Perempuan     | 7     | 46,7 |      |     |     |             |
| **Mother Age**|      |    |      |     |     |             |
| 15 – 20 thn   | 7     | 46,7 |      |     |     |             |
| 21 – 25 thn   | 5     | 33,3 |      |     |     |             |
| 26 – 30 thn   | 1     | 6,7  | 22,47| 17  | 33  | 4,868       |
| 31 – 35 thn   | 2     | 13,3 |      |     |     |             |
| 36 – 40 thn   | -     | -    |      |     |     |             |
| **Gestational Age** | | | | | | |
| <28 mgg       | 1     | 6,7  |      |     |     |             |
| 28 – 32 mgg   | 1     | 6,7  | 33,93| 27  | 36  | 2,789       |
| 32 – 34 mgg   | 5     | 33,3 |      |     |     |             |
| 34 – 36 mgg   | 8     | 53,3 |      |     |     |             |
| **LBW**       |       |    |      |     |     |             |
| 501 – 1000 gr | 1     | 6,7  |      |     |     |             |
| 1001 – 1500 gr| 1     | 6,7  |      |     |     |             |
| 1501 – 2000 gr| 4     | 26,7 | 1992,67| 700| 2470 | 458,050   |
| 2001 – 2500 gr| 9     | 59,9 |      |     |     |             |
| **Body Temperature** | | | | | | |
| 35.6 – 36.0°C | 7     | 46,7 |      |     |     |             |
| 36.1 – 36.5°C | 8     | 53,3 | 36,127| 35,7| 36,5| 0,2658     |
| 36,6 – 37.0°C | -     | -    |      |     |     |             |

Table 2 shows that the characteristics of LBW in the treatment group in the incubator based on the baby's age obtained a mean of 0.73 or 0 days, with a standard deviation of 1.792. Gender characteristics were dominated by male with 8 infants (53.3%). The characteristics of the mother's age are dominated by ages between 15 - 20 years with 7 mothers (46.7%). The
characteristics of the most LBW gestational ages were at 34-36 weeks' gestation with a total of 8 babies (53.3%). Characteristics of LBW infants obtained an average (mean) that is 1992.67 grams, with a standard deviation of 458.050. And the characteristics of the respondent's body temperature obtained an average (mean) of 36.127°C, with a standard deviation of 0.2658.

Table 3 Normality Test and Body Temperature Homogeneity Test in the KMC Group and the Treatment Group in the Incubator

| Group         | Variable          | Measurement | Normality Test | Homogeneity Test |
|---------------|-------------------|-------------|----------------|-----------------|
| KMC Group     | Body Temperature  | Pretest     | 0.792          | 0.001           |
| Incubator Group |                  |             | 0.546          |                 |
| KMC Group     | Body Temperature  | Posttest    | 0.465          | 0.036           |
| Incubator Group |                  |             | 0.242          |                 |

Table 3 is the results of the normality test using Shapiro Wilk showing that the body temperature values in the two groups between before and after the intervention were significant, namely p > 0.05, meaning that all data in the two groups were normally distributed. While the homogeneity test using the Levene test showed that the body temperature in the two groups between before and after the intervention showed p < 0.05, that’s all means that there was a significant difference between the two groups, so it was said that the groups were not the same group.

Table 4 The Average of Body Temperature of KMC Group Before and After KMC Intervention

| Group | n  | Measurement | Mean (°C) | Min – Max (°C) |
|-------|----|-------------|-----------|----------------|
| KMC   | 15 | Pretest     | 36.5993   | 36.50 – 36.73  |
|       |    | Posttest    | 37.0633   | 36.90 – 37.23  |

Based on table 4 in the KMC group before the KMC intervention, the average baby's body temperature was 36.5993°C or 36.59°C. Meanwhile, after KMC the average baby's body temperature was 37.0633°C or 37.06°C.
The Average Body Temperature in the Treatment Group in the Incubator Before and After Treatment in the Incubator

| Group          | n  | Measurement | Mean (°C) | Min – Max (°C) |
|---------------|----|-------------|-----------|----------------|
| Incubator     | 15 | Pretest     | 36.4080   | 36.06 – 36.73  |
|               |    | Posttest    | 36.8033   | 36.56 – 37.10  |

Based on table 5, in the treatment group in the incubator before the incubator intervention, the average baby body temperature was 36.4080°C or 36.4°C. Meanwhile, after the intervention was carried out in the incubator, the average baby's body temperature was 36.8033°C or 36.8°C.

The Results of Paired Sample t-test in the KMC Group Before and After KMC intervention were carried out

| Measurement | Mean (°C) | Std. Deviasi | Delta ( Δ ) | p value |
|-------------|-----------|--------------|-------------|---------|
| Pretest     | 36.5993   | 0.6158       | 0.46400     | < 0.0001|
| Posttest    | 37.0633   | 0.10567      |              |         |

Through the paired sample t-test difference test, it was proven that there was a significant difference in body temperature from the KMC intervention, before and after the intervention was given. The significance of 0.000, p <0.05, means that there is a significant difference in the measurement of the pretest and posttest data. The posttest data (mean = 37.06; SD = 0.10) had a larger average than the pretest data (mean = 36.59; SD = 0.61). Means, the action of KMC is proven to be able to increase the body temperature of LBW.

The Differences in Body Temperature in the Treatment Group in the Incubator Before and After Treatment in the Incubator

| Measurement | Mean (°C) | Std. Deviasi | Delta ( Δ ) | p value |
|-------------|-----------|--------------|-------------|---------|
| Pretest     | 36.4080   | 0.20578      | 0.39533     | <0,0001 |
| Posttest    | 36.8033   | 0.17406      |             |         |

Through the paired sample t-test difference test, it was proven that there was a significant difference in body temperature from the treatment in the incubator, before and after the treatment was given. The significance of 0.000, p <0.05, means that there is a significant difference in the measurement of the pretest and posttest data. The posttest data (mean = 36.8 ;
SD = 0.17) had a larger mean than the pretest data (mean = 36.4; SD = 0.20). Means, the treatment in the incubator proved to be able to increase the body temperature of LBW infants.

The Effectiveness of KMC and Treatment in an Incubator on Increasing LBW infants Body Temperature

| Kelompok   | Delta (Δ)  | Std. Deviasi | t    | df  | p value |
|------------|------------|--------------|------|-----|---------|
| PMK        | 0.4640     | 0.08998      | 2,220| 28  | 0.035   |
| Inkubator  | 0.3953     | 0.07909      |      |     |         |

Through the Independent Sample t-test, the significance was 0.035, p < 0.05, it was proven that there was a significant difference in body temperature increase between KMC and treatment in the incubator, t(28) = 2.220; p < 0.05. The KMC group (Δ = 0.46 ; SD = 0.08) experienced a higher temperature increase than the treatment group in the incubator (Δ = 0.39 ; SD = 0.07).

DISCUSSION

Body Temperature in the KMC Group Before and After KMC Treatment

The two results of the average body temperature before and after the KMC procedure above are still categorized as normal. The mechanism for regulating body temperature in infants is considered imperfect. At the early of after birth, the infants body temperature is still influenced by the ambient temperature. One of the convenient and cost-effective treatment that is often an alternative for LBW babies to raise their body temperature is KMC. KMC is a treatment by making direct contact between the baby's skin and the mother's skin (skin to skin contact). Kangaroo care also significantly improves the bonding and attachment between mother and baby as well as father and baby. The position of the baby who gets KMC makes it easier for mothers to give breast milk directly to their babies (Heriyeni, 2018). KMC intervention for 3 days can produce an average LBW body temperature that increases towards normal and stable. Heat transfer from mother to baby during kangaroo care occurs by conduction, direct contact between two subjects. LBW babies who tend to experience hypothermia will get heat from the mother because the mother's temperature is higher, and this conduction process can transfer about 60% of heat between the mother and the baby's body (Nikmah, 2021)
The difference between the increase in body temperature after and before the KMC was 0.46°C with a standard deviation of 0.089. The results of this study are in line with the research conducted by (Parti et al., 2020) in infants with low birth weight after being given KMC treatment, an increase in body temperature of 0.32 °C was obtained. Research (Fernando et al., 2019), the average axillary temperature in the intervention group after the kangaroo method was carried out was 36.7 with an SD of 0.34. The results of the statistical test showed that the p value was 0.01, so it can be concluded that there was a significant difference in the mean axillary temperature after the kangaroo method was used in the intervention group.

LBW infants has limitations in regulating body functions, one of which is the instability of body temperature so that it can cause hypothermia in LBW infants. One solution to prevent hypothermia in LBW infants is to perform kangaroo care with the principle of doing skin to skin contact so that the baby remains warm, at the same time the baby's skin receives heat from the mother which is then stored in the subcutaneous tissue and body fat that will increase the baby's body temperature to be warmer. The results of the literature review (Litasari & Sunarni, 2022) stated that infants who received KMC in addition to a relatively normal body temperature, also caused regular heart and breathing rates, slept longer, and cried less. Another advantage of KMC treatment is that it will stimulate good cell growth because there is an increase in cell metabolism which is supported by an increase in glucose. The results of the meta-analysis research by (Mekonnen et al., 2019) showed that KMC in premature infants was associated with better cognitive and motor development at the age of six months. In addition to infant and maternal health, KMC shortens the length of hospitalization for the mother and baby, thereby reducing overall health expenditures and providing economic benefits for parents.

The success of KMC in increasing the body temperature of LBW infants is also strongly supported by the mother's role as KMC support. The characteristics of the mother's age in the LBW group with KMC intervention were in the age range of 21-25 years and the LBW infants age was dominated at the age of 1 day. The mother's age range of 21-25 years is an age that is psychologically stable enough to accept and understand the condition of her baby and a 1 day old baby is quite ready to be given KMC intervention. In practice, the mother is quite cooperative and in accordance with the standard of operational procedure so that the baby's body temperature increases after KMC intervention is given.
Body Temperature in the Treatment Group in the Incubator Before and After Treatment in the Incubator

The occurrence of a decrease in body temperature in infants if left unchecked will cause the baby to experience cold stress or hypothermia, therefore the hospital, especially the perinatology or neonate room, has provided an incubator as an initial action when there’s a case of a baby with symptoms of hypothermia. Care in an incubator is a treatment action by keep the baby warm in a bed equipped with a temperature controller to maintain the ambient temperature. In this study, the treatment intervention in the incubator was monitored for 3 days, in which LBW infants whose body weight was < 2500 grams, premature and with less than optimal organ function would be put into the incubator. The temperature, humidity and air in the incubator are adjusted to the conditions and needs of LBW infants. During the 3 days of intervention, the average body temperature increased compared to before the intervention, indicating that the warm incubator environment greatly affects the body temperature of the LBW infants in it. However, LBW infants care in the incubator must be monitored every hour to avoid a very high increase in body temperature (hyperthermia).

The difference between the increase in body temperature after and before the treatment in the incubator was 0.39°C with a standard deviation of 0.079. This result is different from the literature review conducted by (Kusumawardani & Sulistyanto, 2021) which states that there is no difference in body temperature in premature infants before and after treatment in an incubator. The use of an incubator in LBW infants care is not only to keep the baby's body warm, but also to keep the baby from getting infected. LBW babies are usually accompanied by premature pregnancies, so by doing care in an incubator, monitoring the baby's heart rate, breathing, body temperature and blood pressure is easier to do. The use of incubators in developing countries still faced some problems, because in addition to the relatively high maintenance costs, there are also limitations of the equipments. Newborns lose four times more heat than adults, resulting in a drop in temperature. In the first 30 minutes the baby can experience a decrease in temperature of 3-4 °C, this is because the body temperature control center has not functioned perfectly, so it is easy to decrease body temperature, especially because of the cold environment (Pranoto and Windayanti, 2018). Therefore, LBW babies requires an incubator to maintain its body temperature to minimize the use of baby fat for heat production where the fat in LBW babies is less than normal babies.

The use of an incubator is one way to minimize the incidence of hypothermia in newborn babies. Based on the characteristics of the respondents in the treatment group which was in the incubator, maternal age was dominated by the age range of 15-20 years. Mothers aged 15-20...
years are not psychologically stable enough and pregnancy at that age is a vulnerable pregnancy. Therefore, the use of incubators is intended for unstable mothers, babies with certain conditions and babies who need specific care. In this study there was an increase in temperature towards normal. Although the difference is not too big, it can reduce the risk of hypothermia in LBW babies.

The Effectiveness of KMC and Treatment in an Incubator on Increasing LBW babies Body Temperature

The results showed that there was a difference in body temperature between the KMC and treatment in the incubator. This study provides the same results as research conducted by (Damayanti et al., 2019), there is an increase in body temperature between, before, and after being given treatment with the kangaroo method, with a difference of 0.470 C. These results are also in line with research by (Fernando et al., 2019), the results showed that after treatment with the kangaroo method, the average axillary temperature in LBW infants was ±36.7°C, while the control group with the incubator method had an average axillary temperature of ±36.4°C. There is a difference of ±0.4°C between the axillary temperature in the kangaroo method and the incubator method. The result of the study by (Catur Ria Wati et al., 2019) showed that there was a difference in LBW body temperature before and after KMC or in other words, KMC had an effect on LBW body temperature at 95% confidence level. Research conducted by (Purwandari et al., 2019) showed that low birth weight babies, in addition to an increase in body temperature, were also followed by improvements in other physiological functions, namely an increase in heart rate and oxygen saturation. Another advantage of KMC treatment for LBW is to improve physiological functions in the form of rooting, sucking and swallowing reflexes (Kamila and Elisa, 2020).

Babies with LBW have less muscle mass, less brown fat reserves, less subcutaneous fat to store heat and less ability to control skin capillaries. This causes of infants with low birth weight to easily lose body heat and is at risk for hypothermia ((Bobak et al., 2012)). Brown fat reserves will be used to generate heat by LBW in case of cold environmental temperatures. The intervention between KMC and incubator care is to produce a response that increases the heat mechanism in the baby's body to maintain a normal body temperature to minimize the incidence of hypothermia in LBW. In the kangaroo method, there is no heat loss process either through radiation, convection, evaporation or conduction, while with the incubator there is still a process of heat loss through radiation. Basically, the principle of this kangaroo method is that the mother is identified as a kangaroo who can hug her baby carefully, with the aim of maintaining the
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baby’s body temperature optimally (36.5 - 37.5°C). The advantage of KMC is that babies get basic skin to skin needs as a thermoregulator, facilitate breastfeeding, stimulation, protection against infection and can be done both at home and in the hospital (Damayanti et al., 2019). The benefits of KMC are temperature stabilization, namely the baby's body temperature becomes more stable than those treated in the incubator. (Kamila & Elisa, 2020) stated that in the KMC intervention, there will be stability in the baby’s breathing pattern and better heart rate, the baby suckles more often and the duration is longer, and the closeness between mother and baby is better. The results of the literature review conducted by (Kusumawardani & Sulistyanto, 2021) stated that KMC was more effective in increasing the body temperature of LBW infants, when compared to treatment in an incubator. In infants who are treated in incubators, heat loss can still occur through the radiation process, while those treated with KMC do not experience this process.

In this study, in terms of effectiveness, as measured by increasing the body temperature of LBW babies, KMC can have a higher effect on increasing body temperature than treatment in an incubator. Nevertheless, the difference in the increasing body temperature between the two groups was not too large, considering that each group had its own special criteria according to the purposive sampling technique. Both interventions can increase the body temperature of LBW infants to the normal range according to their condition, so KMC and incubator treatment are equally effective in increasing the body temperature of infants with LBW. This study has several limitations so that it can affect the results of the study, including: the differences in the timing of the intervention, that is, there are respondents who are given the intervention in the morning, afternoon and evening, where the environmental temperature at the three times is different and cannot be controlled by the researcher may affect the research results.

CONCLUSION

There is a difference of the increasing body temperature between the KMC treatment and the incubator treatment.

ABBREVIATIONS

LB.: Low Birth Weight; KMC: Kangaroo Method Care; IMR: Infant Mortality Rate; RR: Respiration Rate; CHD: Congenital Heart Disease; CPAP: Continuous Positive Airway Pressure.

COMPETING INTEREST

The authors report no conflict of interest.

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AUTHORS’ CONTRIBUTION

The first author was the collector of the research data, second and third author performed in correcting the result of this research, and the corresponding author was compiling manuscripts.

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