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Kangaroo Mother Care in Improving Thermoregulation of Premature Babies During the COVID-19 Pandemic: A Case Report

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Abstract

Premature babies lose four times more heat than those with sufficient birth weight. Moreover, their body temperature regulation center does not function properly. This study aimed to investigate Kangaroo Mother Care's effect in increasing premature babies' thermoregulation during the COVID-19 pandemic at Hospital A in Malang City, Indonesia. This study was a case report with data from follow-up checks on premature babies discharged from the hospital. The Kangaroo Mother Care method, carried out by the mother, increased the thermoregulation of premature babies' temperature by 0.2°C compared to the father. It was because women have a slightly higher body temperature than men. The comfortable body temperature for women was 2.5°C higher than for men. Men had a lower body mass of fat, so it took an average longer time for metabolism. The Kangaroo Mother Care procedure, especially when done by the mother, can increase the body temperature of premature babies by conduction.

Keywords: COVID-19, Kangaroo Mother Care, premature babies, thermoregulation

Introduction

Birth weight is an indicator of neonatal life used to determine health status.¹ Some of the factors that can lead to low birth weight babies include the nutritional status of the mother during pregnancy, a body mass index (BMI) <18.5, the age of the mother being less than 20 years or more than 30.² The interval between births being less than 24 months.²

Premature babies experience an inability to maintain a normal body temperature because they lose heat four times greater than babies with sufficient birth weight, and their body's heat regulation center does not function properly.³ They cannot adjust their body position and clothes to avoid getting cold.³ The incidence of premature babies experiencing hypothermia was 29.1% at Hospital A in Malang City, East Java Province, Indonesia.

Globally, the number of premature births in 2018 was 20.5%.⁴ In the United States, about 250,000 premature and low birth weight babies are born each year, accounting for 8.8% of births.⁵ In Iran, 5,000 neonates are born daily, and about 12% are underweight.⁵ Indonesia ranked fifth for the number of premature births worldwide in 2018, with a figure of 675,700, and ranked ninth for the number per live birth.⁴ East Java Province has the

second highest incidence of premature babies, reaching 21,544.⁶ Among its cities/districts, the highest prevalence is in Jember District, with 1,887 incidents, while Mojokerto City has the lowest incidence, with 73 incidents.⁶

Premature babies born during the coronavirus disease 2019 (COVID-19) pandemic risked experiencing health problems caused by the uncontrolled coronavirus in the hospital. During the lockdown, preterm labor decreases due to social distancing restrictions which can reduce pathogenic infection.⁷ Immature long-term is needed to prevent complications by maintaining body temperature, regulating and monitoring nutritional intake, preventing infection, weighing, administering oxygen, and monitoring the airway.⁸ Premature babies tend to experience hypothermia, so babies need to be treated in an incubator.⁹ Besides the incubator, one way to maintain the baby's body temperature stability is to give them warm blankets and hats and implement the kangaroo method.¹⁰

The kangaroo method is carried out by direct contact between the mother's and baby's skin to stabilize the baby's temperature and increase breastfeeding activity so that the baby's weight increases.¹¹ It is a free therapeutic method mothers could use at home during the COVID-

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19 pandemic.¹² Babies who receive Kangaroo Mother Care (KMC) will have a better psychological and emotional experience; with this method, the baby receives more warmth and is closer to the mother, improving the baby's quality of life.¹³ This study aimed to check whether KMC increased the thermoregulation of premature infants during the COVID-19 pandemic by comparing two cases from Hospital A in Malang City, Indonesia.

Method

The study was a case report with a descriptive approach. The population was mothers with premature babies who had returned from the hospital, and the sample was taken three days after the discharge. The data were taken in December 2021 during the COVID-19 pandemic in Hospital A, Malang City, East Java Province, Indonesia. The initial sample was five, but after returning from the hospital, three babies experienced a decrease in their condition: two babies suddenly became short of breath, and one had COVID-19 symptoms.

Results

This study compared two cases from Hospital A in Malang City. Hospital A is a type A referral hospital with a higher premature birth rate than other hospitals in Malang City. The babies' and mothers' data will be shown in Table 1 and 2.

The mother of Case 1 routinely checked the pregnancy every month and planned a sectio caesarea (SC) when the baby reached a weight of 1,750 grams due to a premature rupture of membranes. The mother gave birth via SC on 25 December 2021. The baby immediately cried, breathed spontaneously, and was treated in the perinatology room for three days. The baby's body temperature was 35°C and was exposed to cold air from the fan in the room after being discharged from the hospital. The mother was given information about KMC, an alternative

method of increasing premature babies' body temperature, by health workers. The mother carried out KMC so that the baby was not cold and was close to the mother (Figure 1). The KMC was given by the mother routinely every two hours for four weeks. The temperature was measured on the fourth week at 36.8°C. The baby drank formula milk every two hours (35-40 cc) because the mother was not producing breast milk. The baby had been immunized with Hb0.

The baby in Case 2 was born on 12 December 2021 via SC. The baby was the mother's second child, born 6.5 years after the first one. The baby immediately cried and breathed spontaneously after birth. However, the mother had a prenatal history of preeclampsia from the second trimester to 34 weeks of gestation. Therefore, the baby had jaundice on the third day after returning from the hospital with an indirect bilirubin level of 3 mg/dL and a direct bilirubin of 0.6 mg/dL until the tenth day and was given light therapy for seven days. Fortunately, the baby had been immunized with Hb0, and the condition improved until the indirect bilirubin level of 0.3 mg/dL and a direct bilirubin level of 0.1 mg/dL were measured. The baby was bathed by the grandmother to maintain a body temperature of 33°C. The baby shivered, the skin on the extremities of his hands and feet was cold and pale, and he often slept. Families had been given information about KMC by health workers as an alternative method of increasing the body temperature of premature babies and mentioned it was an alternative to incubators. In contrast to Case 1, the father performed KMC because the mother was undergoing independent isolation due to COVID-19 (Figure 2).

Discussion

Based on the results of the two case reports, the KMC method carried out by the mother increased the temperature of premature babies by more than 0.2°C compared

Table 1. Characteristic of the Baby

| | Age* | BW/BL | APGAR Score | Gestational Age | Sex |
|--------|---------|-------------------|-------------|-----------------|--------|
| Case 1 | 3 days | 1,750 grams/46 cm | 8 | 33 weeks | Female |
| Case 2 | 11 days | 1,600 grams/48 cm | 6 | 34 weeks | Male |

Notes: *Age after discharge from the hospital, BW = Birth Weight, BL = Birth Length

Table 2. Characteristic of the Mother

| | Age | Age When Married | Occupation | Monthly Income | Education | Pregnancy Complication |
|--------|----------|------------------|----------------|----------------|------------------------|--------------------------------|
| Case 1 | 19 years | 17 years | Self-employed | IDR 4,000,000 | Vocational high school | Premature rupture of membranes |
| Case 2 | 33 years | 25 years | Factory worker | IDR 4,500,000 | High school | Prenatal preeclampsia |



Figure 1. Kangaroo Mother Care Performed by the Mother (Case 1)



Figure 2. Kangaroo Mother Care Performed by the Father (Case 2)

to the father. These results were because women have a slightly higher body temperature than men. The comfortable body temperature for women is 2.5°C higher than for men due to physical differences.¹³ Men have a lower body fat percentage, so metabolism takes longer on average.¹⁴

Women's bodies have a higher temperature because of higher levels of brown fat, which produces heat through thermogenesis.¹⁵ Thermoregulation occurs through the influence of thyroid hormones and the nervous system.¹⁶ This condition affects the metabolic rate: physiologically, the human body can carry out homeostasis to maintain body temperature in the thermoregulation center, the hypothalamus.¹⁶

The implementation of KMC at Hospital A initially took 8-10 hours. However, during the COVID-19 pandemic, it could only be carried out in two hours due to visitor restrictions in the perinatology room. A study by Nayyar et al. also stated that during the COVID-19 pandemic, KMC was implemented for two hours, but it could be continued at home by wearing a mask.¹⁷

The knowledge and readiness of families of premature babies is one of the factors determining the success of implementing KMC. This condition applies to mothers and other family members, such as husbands, parents, or relatives living in the same house.¹⁴ A previous study also stated that KMC is a life-saving intervention for neonates, as well as the cornerstone of family-centered care.¹⁸

During the COVID-19 pandemic, KMC was still carried out by mothers while following health protocols such as wearing masks. Considering the limited number of incubators in hospitals and many premature newborns,

KMC is vitally important. Through skin-to-skin contact, it can maintain the baby's body temperature via conduction, increase the baby's attachment to its parents, stimulate the baby's suckling reflex by direct breastfeeding, and increase the baby's weight by fulfilling nutritional needs.¹⁸ If the mother is diagnosed with COVID-19, her role can be performed by the father or other family members.¹⁸ Families receiving information from and communicating with health workers are more motivated to continue KMC at home.¹⁴

Stabilizing the thermoregulation status of premature babies can reduce the occurrence of mortality.²⁰ Health workers should follow up on the condition of premature babies recently returned from the hospital after three days, one week, and two weeks.²¹ Even after the first year of the COVID-19 pandemic, the KMC method was still taught to mothers of premature babies, who gave their newborns KMC within a few hours to improve their quality of life.

Conclusion

The KMC method can improve the temperature thermoregulation status of premature babies. However, implementing this method requires the support of all family members. If the mother cannot do KMC, other family members can, and health workers need to conduct follow-up home visits to evaluate the thermoregulatory status of premature babies.

Abbreviations

BMI: Body Mass Index; COVID-19: coronavirus disease 2019; KMC: Kangaroo Mother Care; SC: Sectio Caesarea.

Ethics Approval and Consent to Participate

The case report has gone through the research ethics committee of the Faculty of Health Sciences, Brawijaya University, No. 1659/UN10.F17104/TU/2021.

Competing Interest

The authors declare that there are no significant competing financial, professional, or personal interests that might have affected the performance or presentation of the work described in this manuscript.

Availability of Data and Materials

Data was taken directly by the authors when following up on the condition of premature babies at home.

Authors' Contribution

ADW conceived the design of the study and finished the manuscript. YSA searched for related articles. RFPK documented the data. CPL proofreads the manuscript. REK observed and interviewed the respondents.

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