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Original Research Article

The Relationship Between the Duration of Kangaroo Mother Care and Edinburgh Postnatal Depression Scale Outcomes in Mothers with Preterm Infants

Ivena Celia Eileen Pranoto[1]*, Adhie Nur Radityo Suswihardhyono[2], Natalia Dewi Wardani[3]

[1]*Faculty of Medicine, Universitas Diponegoro, Indonesia*
[2]*Department of Pediatrics, Faculty of Medicine, Universitas Diponegoro, Indonesia*
[3]*Department of Psychiatry, Faculty of Medicine, Universitas Diponegoro, Indonesia*

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Abstract

Background: Preterm birth has a negative impact on the health of the baby and increases the risk of postpartum depression in mothers. Kangaroo mother care (KMC) is a preterm baby care which is considered to increase bonding between mother and baby, thereby reducing the incidence of postpartum depression.

Objective: To find out the relationship between the duration of KMC and other confounding factors with EPDS outcomes in mothers with preterm infants.

Methods: This study used a quasi-experimental method with non-randomized control group pre-test and post-test design and was conducted on 34 mothers with preterm infants who gave birth at Dr. Kariadi Hospital Semarang. The research subjects were selected using consecutive sampling method and were asked to perform kangaroo mother care for a certain duration. The treatment group was instructed to perform KMC for 120 minutes daily, whereas the control group was instructed to perform KMC 60 minutes daily for 14 days. Evaluation for postpartum depression was carried out using the Edinburgh Postnatal Depression Scale questionnaire, which was completed twice, as a pre-test and post-test. Data analysis was performed using paired sample T-test and independent samples T-test to determine the relationship between variables.

Results: Results showed that there was a significant relationship between the duration of KMC and EPDS outcomes. The difference between the decreased of EPDS scores in the control and treatment groups was significant (p=0.017). The significant decrease of EPDS score was found in the treatment group (-1,398±1,403; p<0.001). The decrease of EPDS score in the control group was not significant (-0,967±1,403; p=0.704). There is a significant relationship between the method of childbirth (p<0,001) and breastfeeding status (p=0,042) with EPDS outcomes in mothers with preterm infants. There is no significant relationship between maternal age and EPDS outcomes (p=0,805).

Conclusion: Increasing duration of KMC lowers the score of EPDS in mothers with preterm infants.

Keywords: *Postpartum depression; Preterm, Kangaroo Mother Care (KMC); Edinburgh Postnatal Depression Scale (EPDS)*
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INTRODUCTION

Preterm birth is defined as a birth that occurs before 37 weeks of gestational age.[1,2] Globally, preterm birth is the leading cause of death among children under the age of five.[1] In 2018, Indonesia ranked fifth among countries with the highest rates of preterm birth in the world, with an incidence of 676,700 per year.[3] According to the *Riset Kesehatan Dasar* 2018 data, 19% deliveries in Central Java occurred at preterm gestational ages.

* Corresponding author:
E-mail: *ivenacelia@gmail.com*
(Ivena Celia Eileen Pranoto)

Semarang city itself is one of the areas in Central Java that requires special attention due to its higher percentage of preterm birth, which is 31.91%.[4] Although most preterm infants survive, they are at high risk for neurodevelopmental disorders and other complications.[5]

The high risk of complications experienced by preterm infants not only affects the infants themselves, but also has an impact of the psychological well-being of the mothers. Mothers who go through preterm birth are at risk of experiencing postpartum depression, which can affect the mother-infant bonding and the infant's development.[6] Previous research has indicated that 39% women who give birth to preterm infants experience significant symptoms of depression.[7]

Postpartum depression is a major depressive disorder that occurs during the postpartum period, within four weeks of delivery. Postpartum depression screening can be conducted using Edinburgh Postnatal Depression Scale (EPDS) instrument. This instrument consists of 10 short questions about the mother feelings over the past week. The questionnaire has been translated and validated in Indonesian language with a sensitivity of 87.5% and a specificity of 61.6%.[8]

Kangaroo mother care (KMC) is a method of caring for preterm infants that involves direct skin-to-skin contact between the mother and the baby. This method involves placing the baby upright between the mother's breast and positioning the mother's chest against the baby's chest, maintained using a wrap or cloth for at least 60 minutes. This method can be started once the infant is medically stable, and is often done until the baby reaches full-term age, which is around 40 weeks of gestational age, or after the baby reaches a weight of 2500 grams. During those time, baby will start to show signs of discomfort when positioned for KMC.[9] Numerous studies have confirmed that the implementation of KMC not only benefits the growth and development of the baby but also helps improve bonding between the mother and the baby while reducing postpartum anxiety in mothers. KMC allows mother to engage in continuous skin-to-skin contact, which enhances the bond between mother and infant, and promotes increased in positive feeling, which ultimately reduces the risk of postpartum depression.[10,11] However, another study found that prolonged periods of KMC can be a tiring experience, which can have an impact on the mother's psychological well-being.[12]

The differences in previous research findings serve as the basis for conducting a study on the relationship between the duration of KMC and the EPDS outcomes. Time limits of 60 minutes and 120 minutes were used in this study to compare the effectiveness of different durations in reducing EPDS scores in mothers with preterm infants. The selection of these two durations was made to compare both the upper and lower borderline of the recommended time limit, with the hope that babies would still receive optimal benefits from the application of this method.[13,14]

MATERIALS AND METHODS

This study was conducted at the Maternal and Child Care and the Medical Report Unit of Dr. Kariadi Hospital Semarang. Data collection took place over a period of 5 months, specifically from May to September 2023. The method used in this study is a quasi-experimental with non-randomized control group of pre-test and post-test design. The sample size for this study consisted of 34 respondents who met the inclusion and exclusion criteria. Inclusion criteria included mothers who gave birth to their babies at a gestational age of less than 37 weeks, were willing to participate in the study, and had stable baby conditions. Exclusion criteria included mothers with communication limitations, such as not having a cellphone or being unable to make video calls, and experiencing language barriers; mother with education level below junior high school, and mother who has been previously diagnosed with depression. Dropout criteria included subjects who did not perform KMC according to the procedure, or perform KMC with a duration less than the specified guidelines of this study, which is less than 60 minutes per day and/or less than 2 weeks (control group), or less than 120 minutes per day and/or less than 2 seeks (treatment group); and subjects who did not participate in the post-test.

The research began with obtaining ethical research approval from the Health Ethics Commission of the Faculty of Medicine, Universitas Diponegoro with No. 168/EC/KEPK/FK-UNDIP/V/2023. Permission from Dr. Kariadi Hospital Semarang was obtained thereafter. Subsequently, the researcher approached potential participants who met the inclusion criteria to provide an explanation of the research process and inquire about their willingness to participate in this study. Subjects who agreed to participate were asked to sign an informed consent form and complete a demographic questionnaire, including education level, mother's age, baby's age, mother's employment status, gestational age at delivery, delivery method, and breastfeeding status; as well as the EPDS questionnaire. Participants were randomly assigned into control and treatment groups. The control group were asked to perform KMC for 60 minutes per day, while those in the treatment group were asked to perform KMC for 120 minutes per day for 14 days. At the end of the study, all participants were requested to complete the EPDS questionnaire again. The researcher provided support to the participants during the completion of questionnaires and implementation of KMC. Support was conducted in-person while the participants were hospitalized. Following their discharge from the hospital, support was continued via video calls.

This study used independent variable in the form of the duration of KMC, dependent variables in the form of the EPDS outcomes, and confounding variables including delivery method, breastfeeding status, and maternal age during pregnancy. Data obtained were analyzed using SPSS Statistics 27 software. Normality testing of the EPDS scores was conducted using Saphiro-Wilk test. EPDS scores were presented in the form of mean and standard deviation as they followed a normal distribution. Nominal scale data were presented as percentages and frequencies. Hypothesis testing to analyze the relationship between independent and dependent variables was conducted using paired T-tests. Analysis of the outcome differences between the treatment and control groups was performed using independent samples T-tests.

Table 1. Characteristics of the Research Subjects

Variable	Group		*p*
	Control	Treatment	
Mother's employment status			
Employed	10 (29,4%)	12 (35,3%)	0,473*
Not employed	7 (20,6%)	5 (14,7%)	
Infant's age at the start of KMC			
<14 days	7 (20,6%)	8 (23,5%)	0,730*
≥14 days	10 (29,4%)	9 (26,5%)	
Gestational age (median [iqr])	36 (2)	35 (4)	0,454€

Note: * Chi square; € Mann-Whitney Test

Table 2. The Relationship Between the Duration of KMC and EPDS outcomes

Group	EPDS		*p*	Delta
	Pre-test	*Post-test*		
Control	7,076±1,788	6,842±1,683	0,704†	-0,967±1,431
Treatment	6,863±1,673	4,911±1,819	<0,001*†	-1,398±1,403
p	0,872§	0,094§		0,017*§

Note: * Significant (p<0,05); § *Independent samples T-test*; † *Paired T-test*

Table 3. The Relationship Between Confounding Variables and EPDS Outcomes

Variable	n		EPDS (*pre-test)*	*p*
	Control	Treatment		
Method of childbirth				
Normal	7 (20,6%)	4 (11,8%)	4,388±1,613	<0,001£
CS	10 (29,4%)	13 (38,2%)	8,696±1,522	
Breastfeeding status				
Exclusive breastfeeding	12 (35,3%)	14 (41,2%)	6,282±1,685	0,042£
Not exclusive breastfeeding	5 (14,7%)	3 (8,8%)	9,763±1,625	
Maternal Age				
<35 years	12 (35,3%)	15 (44,1%)	6,886±1,767	0,805£
≥35 years	5 (14,7%)	2 (5,9%)	7,2962±1,560	

Note: £ Biserial test

Biserial correlation analysis was used to examine the relationship between confounding variables and the dependent variables.

RESULTS

This research was conducted at Dr. Kariadi Hospital Semarang from May to September 2023. The research subjects involved in this study were mothers with preterm infants who had given birth at Dr. Kariadi Hospital and were still performing KMC. Sampling was carried out using consecutive sampling techniques, using both primary and secondary data. Considering the inclusion and exclusion criteria, the total number of samples obtained was 34 mothers with preterm infants, divided into 17 subjects for the control group and 17 subjects for the treatment group.

Table 1 shows that the majority of employed mothers are from the treatment group, but there is no significant difference. From both groups, it is found that the majority of mothers begin KMC when their baby is 14 days or older, with no significant difference. There is no significant difference in the gestational age of mothers in both the control and treatment groups, but based on the data in the table, it is known that the gestational age in the treatment group is younger than in the control group.

Data in table 2 summarizes the relationship between the duration of KMC and EPDS outcomes. It shows that the mean EPDS scores during the pre-test are lower in the treatment group than in the control group, but the difference is not significant. In the post-test, the treatment group has lower EPDS scores, but the difference remains not significant. From the data obtained, it is found that both the control and treatment groups experienced a reduction in EPDS scores after undergoing KMC for 14 days, with a higher reduction in the treatment group. The reduction in EPDS scores in the control group is not significant, but the reduction in scores in the treatment group is significant. The difference in the magnitude of the reduction of EPDS scores between the control and treatment groups are significant.

Table 3 shows the biserial analysis between confounding variables and EPDS outcomes. Looking at this table, it is known that the majority of mothers who underwent normal delivery are from the control group. Biserial correlation test shows that there is a significant relationship between the childbirth method and EPDS outcomes, where subjects who underwent normal delivery shows lower EPDS score than those who underwent caesarean section. The data also shows that there is a significant relationship between breastfeeding status and EPDS outcomes, where subjects who exclusively breastfeed shows lower EPDS score than

those who do not exclusively breastfeed. Regarding the data on the relationship between maternal age during pregnancy and EPDS outcomes, it is found that there is no significant relationship between these two variables. However, the data shows that EPDS scores are slightly lower in mothers under the age of 35.

DISCUSSION

Data analysis on the characteristics of the research subjects indicates that there is no significant difference in mother's employment status, infant's age at the start of KMC, and gestational age between the control and treatment group. These three variables can influence the EPDS outcomes, so the insignificant differences between two groups reduce bias in the research results. Previous research showed that there is a relationship between employment status and postpartum depression. The risk of postpartum depression was found to be lower in non-employed mothers because they can adapt more easily to their new role as a mother.[15] Referring to the guidelines set by WHO, KMC can only be commenced when the baby's condition is stable, indicated by the ability to breathe spontaneously without the need for oxygen assistance. Babies who can start KMC earlier are those who reach the stable phase sooner.[9] Previous research conducted on mothers with infants admitted in the NICCU revealed that a baby's poor condition can affect the mother's serotonin levels, leading to maternal anxiety and depressive symptoms. The earlier a mother begins KMC, the lower the risk of experiencing postpartum depression.[16] It is known that a lower degree of prematurity would lead to increased levels of anxiety and depressive symptoms in mothers due to the mother's concern about the potentially worse condition of their babies compared to babies born at a more mature gestational age.[17]

Based on the analysis of the relationship between the duration of KMC and EPDS outcomes in mothers with preterm infants in this study, it is evident that performing KMC with a duration of 120 minutes per day for 14 days led to a significant decrease in EPDS scores in mothers with preterm infants. Performing KMC with a duration of 60 minutes per day for 14 days also resulted in a decrease in EPDS scores, but the decrease was not significant. The differences in the reduction of EPDS scores between the two groups was significant. These findings are aligned with the results of a study conducted in Torrecárdenas University Hospital which showed a significant reduction in EPDS scores in mothers who performed KMC for over than 90 minutes per day for 2 weeks.[13] Performing KMC with a longer duration is considered to enhance the bond between the mother and the baby, thereby positively impacting the mother's psychological well-being.[18]

Kangaroo mother care allows mothers to have skin-to-skin contact with their babies. Skin-to-skin contact leads to a continuous significant decrease in cortisol levels and an increase in oxytocin levels in mothers, which in turn contributes to a reduction in anxiety and depression levels.[19]

From a psychological perspective, skin-to-skin contact between mother and her baby can promote increased satisfaction, a sense of peace, heightened energy, tranquility, and relaxation of mind. These effects can help minimize the risk of postpartum depression.[20]

This study found that the method of childbirth is significantly associated with EPDS outcomes in mothers with preterm infants. The pre-test results showed that mothers who underwent a normal delivery had significantly lower average EPDS scores compared to mothers who had a cesarean section (CS). The research findings are consistent with a previous systematic review which states that the incidence of postpartum depression is higher in mothers who have undergone a CS due to their lower satisfaction with the birthing experience and prolonged post-CS pain[21]. Another study also revealed that emergency caesarean section can increase the risk of postpartum depression because most pregnant women generally expect a normal delivery process to experience a more "natural" birthing process. When this process is disrupted by an emergency caesarean section, it is highly likely for a mother to feel disappointed, a sense of failure, and a loss of control; ultimately increasing the risk of postpartum depression.[22]

The analysis of the relationship between breastfeeding status and EPDS outcomes in mothers with preterm infants in this study showed that there is a significant relationship between breastfeeding status and EPDS outcomes in mothers with preterm infants. This is reflected in the pre-test results, which indicate that mothers who exclusively breastfeed have significantly lower average EPDS scores compared to mothers who do not exclusively breastfeed. This finding is consistent with previous research conducted in 2020 which states that exclusive breastfeeding can reduce the incidence of mood disorders.[23] Exclusive breastfeeding also allows mothers to have skin-to-skin contact with their babies, thereby reducing the risk of postpartum depression through the same mechanism as KMC.[19]

This study found that there is no significant relationship between maternal age during pregnancy and EPDS outcomes in mothers with preterm infants. The pre-test results show that mothers under the age of 35 have slightly lower average EPDS scores compared to mothers aged 35 or older, but the difference is not significant. A study conducted by Muraca, et al. states that mothers aged 35 or older have a higher risk of postpartum depression compared to mothers under the age of 35. This is because there is a perception that older women may struggle with the adjustment to motherhood, lack peer support, and have an increased risk of postpartum complications, all of which contribute to the increased risk of postpartum depression. The underlying factor in the role of age in postpartum depression is mainly social support. Older mothers tend to have lower social support due to negative individual perceptions and views about older mothers.[24] This relationship is not always consistent due to variations in the social environment of each subject. When their environment provide sufficient support, older mothers can still maintain lower levels of depression.[25]

This study has several limitations. The first limitation is that the follow-up conducted on patients who were no longer admitted at Dr. Kariadi Hospital was only done using video calls, which could potentially introduce bias. Another limitation is the difference in the timing of EPDS data collection during the pre-test. Some research subjects had already undergone KMC before the pre-test

data collection was conducted.

CONCLUSION

In conclusion, this study shows that there is a relationship between the duration of KMC and EPDS outcomes, where an increase in the duration of KMC reduces the EPDS scores in mothers with preterm infants. This study also shows that there is a significant relationship between the method of childbirth and breastfeeding status with EPDS outcomes in mothers with preterm infants. However, there is no significant relationship between maternal age and EPDS outcomes. Further research which uses direct observation as the follow-up techniques might be needed to obtain more accurate data.

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