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## Research Article

# Association Between Kangaroo Mother Care and Stress Level of Mothers with Low Birth Weight Infants

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## Abstract

**Objective:** The aim of this study was to determine the association between kangaroo mother care (KMC) of low birth weight infant (LBW) and maternal stress level. **Materials and Methods:** Study design was a prospective cohort with 40 subjects, consisting of 20 subjects in KMC group and 20 subjects in Conventional Method of Care (CMC) group. The differences between variables were analyzed by independent sample t-test and Mann-Whitney test. Meanwhile, the correlations between variables were analyzed by chi-square test. **Results:** The result showed that lower maternal stress level in the fourth week was significantly correlated with KMC practice ( $p < 0.05$ ). **Conclusion:** Kangaroo mother care was an appropriate method of care for low birth weight infants to reduce postpartum maternal stress.

**Key words:** Health status of infant, infant, kangaroo mother care, low birth weight, maternal stress level

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**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

Low birth weight (LBW) infant is considered as an index of community health status in general, as well as maternal health and nutritional status in particular<sup>1</sup>. Most cases of LBW infants are affected by the circumstances during pregnancy, either the maternal condition or fetus condition itself<sup>2</sup>. The infants are categorized as LBW if their birth weights were less than 2500 g<sup>3</sup>.

The average prevalence of LBW infants in the world reaches 15% and the prevalence can reach 28% in developing countries such as India, Pakistan, Nigeria, the Philippines and Indonesia<sup>4</sup>. LBW infant in Southeast Asia is the cause of 15% neonatal deaths<sup>5</sup>. Based on Basic Health Research data, the prevalence decreased from 11.5% in 2007 to 11.1% in 2010 and 10.2% in 2013<sup>6</sup>. However, the figure was still far from the targets set out for LBW infants i.e. less than 5%<sup>7</sup>.

Mothers with LBW infants are at risk of stress due to separation from their babies. One of the methods of care which may affect the mental health of the mother in postpartum period is kangaroo mother care (KMC)<sup>8</sup>. Some randomized controlled trial (RCT) studies found that KMC could reduce maternal anxiety<sup>9</sup>, maternal stress<sup>10</sup> and maternal postpartum depression<sup>11,12</sup>.

General objective of this study was to analyze and describe the association between KMC and maternal stress level. The specific objectives of this study were to: (1) Identify the maternal characteristics (age, parity, type of childbirth, education level and occupation) and characteristics of LBW infants (birth weight, birth length, gestational age and gender), (2) Analyze the maternal stress level, either in the KMC group or the conventional method of care (CMC) group.

## MATERIALS AND METHODS

**Study design, time and site:** This study used prospective cohort design and was conducted from December 2014 to March 2015 in Bogor Regency. This study had been reviewed and the ethical clearance had been approved by Faculty of Medicine, University of Indonesia No.134/UN2.F1/ETIK/2015. Sample size and sampling method

The subjects in this study were mothers and LBW infants that had received treatment at hospitals. The subjects were assigned to the KMC group and the CMC group. The subjects for the KMC group were selected from Sehat Terpadu Dompot Duafa Hospital and Medika Dramaga Mother and Infant Hospital. The subjects for the CMC group were selected from hospitals that did not perform KMC practices and their characteristics were the same as the ones in the KMC group. The subjects were selected using a consecutive sampling

(non-probability sampling) method in which all people that came and met the inclusion criteria were included in the study until the required sample size was achieved<sup>13</sup>. The subjects selected for this study were those that met the inclusion criteria. The inclusion criteria for infants were as follows: (1) Birth weight from 1,500-2,499 g, (2) The infants were two weeks old and they had been in stable condition, (3) Having the ability to suck; and 4) having a good swallowing ability. The inclusion criteria for the mothers were as follows: (1) Literate, (2) Providing exclusive breastfeeding and (3) Living in Bogor Regency based on the resident's identity card or certificate from local government. The minimum sample size for each group was 18 pairs of mother and LBW infant with 10% addition; thus, it became 20 pairs in each group.

**Data types and collection methods:** The types of data collected were primary and secondary data. The primary data were KMC practices and maternal stress level. KMC practice data were collected using a recording sheet. The sheet was given to each subject and the subject then recorded KMC practices in each session for 24 h. Researchers conducted home visits together with some cadres who resided and settled in the same location as the subjects' houses to monitor the subject compliance in KMC implementation. The maternal stress level in this study was measured using the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU) that had been modified according to situation and condition. The final assessment of this instrument used Metric 2 because it better described the overall maternal stress level, either related to the environmental conditions, the infant conditions and the role of the mother in the care of her infant. In the assessment using Metric 2, a score was given to all experiences or situations that were asked in PSS:NICU. The conditions or situations not experienced by respondents were considered as non-stressful situations; thereby, score 1 was given and there was no zero score. Score 2 was given if the experience or situation that was asked caused mild stress, score 3 was given if it caused severe stress, score 4 was given if it caused very severe stress and score 5 was given if it caused extreme stress. The mean was calculated by dividing the total score by the number of questions asked in PSS:NICU<sup>14</sup>.

Secondary data were collected from patients' medical records including maternal characteristics (age, parity, type of childbirth, education level and occupation) and LBW infants' characteristics (gender, gestational age, birth weight and birth length).

**Data processing and analysis:** The data were processed through several stages, namely editing, coding, processing and cleaning. Statistical analyses used in this study were

descriptive statistics (frequency, mean and standard deviation) and inferential statistics. Inferential statistic performed in this study was chi-square test to analyze the association between KMC and maternal stress level. Results of analysis considered as significant if  $p < 0.05$ .

## RESULTS

**Subjects' characteristics:** Overall, there were no significant differences ( $p > 0.05$ ) in subjects' characteristics, either in KMC group or CMC group, except for the type of childbirth as presented in Table 1. Most of the mothers (65%), either in KMC group or CMC group, aged between 20 and 35 years. In both groups, more than half of the mothers had primary education level (72.5%) and unemployed (67.5%). The number of mothers giving birth in sectio (55%) was 3.6 times greater in KMC group than CMC group (15%). On the contrary, the proportion of mothers giving birth normally in CMC group (85%) was almost twofold higher compared with KMC group

(45%). The proportion of female LBW infant in KMC group (70%) was 1.5 times higher than CMC group (45%) whereas the proportion of male LBW infant in KMC group (55%) was almost twice greater than the CMC group (30%).

There were no significant differences ( $p > 0.05$ ) between both groups based on parity, gestational age and infant's characteristics (Table 2). Mean maternal parity was  $2.1 \pm 1.1$  in KMC group and  $1.8 \pm 1.2$  in CMC group. Mean gestational age was  $35.8 \pm 2.6$  weeks in KMC group and  $35.8 \pm 3.1$  weeks in CMC group. Mean birth weight and birth length in KMC group were  $2045.2 \pm 242.8$  g and  $44.8 \pm 2.0$  cm respectively.

**Maternal stress level:** Although not significant, there was a tendency that KMC reduced stress level in the first week of practice. This was indicated by the absence of severe stress in KMC group while mothers who did not perform KMC were still experiencing severe stress (10%) (Table 3). In the fourth week, there was significant association ( $p < 0.05$ ) between KMC practice and maternal stress level (Table 4).

Table 1: Distribution of subjects based on their characteristics (age, education, occupation, type of childbirth, infant gender) and methods of caring low birth infants

Characteristics	KMC		CMC		Total		p-value
	No.	Percentage	No.	Percentage	No.	Percentage	
Maternal age (years) <sup>a</sup>	<20	3	15	3	15	6	15.0
	20-35	12	60	14	70	26	65.0
	>35	5	25	3	15	8	20.0
	Mean $\pm$ SD	$28.35 \pm 7.13$		$25.95 \pm 5.8$		$27.15 \pm 6.48$	0.252 <sup>1</sup>
Maternal education <sup>a</sup>	Primary	15	75	14	70	29	72.5
	Middle	4	20	5	25	9	22.5
	High	1	5	1	5	2	5.0
Maternal occupation <sup>a</sup>	Unemployed	15	75	12	60	27	67.5
	Employed	5	25	8	40	13	32.5
Type of childbirth <sup>a</sup>	Normal	9	45	17	85	26	65.0
	Sectio	11	55	3	15	14	35.0
Infant gender <sup>b</sup>	Male	6	30	11	55	17	42.5
	Female	14	70	9	45	23	57.5

KMC: Kangaroo Mother Care, CMC: Conventional Method of Care, <sup>a</sup>: Maternal characteristics, <sup>b</sup>: Infant's characteristics; <sup>1</sup>independent sample t-test, <sup>2</sup>Mann-Whitney test,

\*Significant at  $\alpha < 5\%$

Table 2: Distribution of subjects based on parity, gestational age, infant's characteristics and methods of caring low birth weight infants

Characteristics	KMC (Mean $\pm$ SD)	CMC (Mean $\pm$ SD)	p-value
Parity <sup>a</sup>	$2.1 \pm 1.1$	$1.8 \pm 1.2$	0.340 <sup>1</sup>
Gestational age (weeks) <sup>b</sup>	$34.2 \pm 2.6$	$35.8 \pm 3.1$	0.080 <sup>1</sup>
Birth weight (g) <sup>b</sup>	$2045.2 \pm 242.8$	$2124.0 \pm 352.7$	0.416 <sup>1</sup>
Birth length (cm) <sup>b</sup>	$44.8 \pm 2.0$	$45.0 \pm 2.7$	0.842 <sup>1</sup>

KMC: Kangaroo Mother Care, CMC: Conventional Method of Care, <sup>a</sup>: Maternal characteristics, <sup>b</sup>: Infant's characteristics, <sup>1</sup>independent sample t-test

Table 3: Cross tabulation of maternal stress level and methods of caring the low birth weight infants in the first week

Method of care	No stress		Mild stress		Severe stress		p-value
	No.	Percentage	No.	Percentage	No.	Percentage	
KMC	14	70.0	6	30.0	0	0.0	0.098 <sup>3</sup>
CMC	8	40.0	10	50.0	2	10.0	

KMC: Kangaroo Mother Care, CMC: Conventional Method of Care, <sup>3</sup>chi-square test

Table 4: Cross tabulation of maternal stress level and methods of caring low birth weight infants in the fourth week

Method of care	No stress		Mild stress		Severe stress		p-value
	No.	Percentage	No.	Percentage	No.	Percentage	
KMC	20	100.0	0	0.0	0	0.0	0.008 <sup>3</sup>
CMC	14	70.0	6	30.0	0	0.0	

KMC: Kangaroo Mother Care, CMC: Conventional Method of Care, <sup>3</sup>chi-square test

## DISCUSSION

Most mothers (65%) in both groups aged between 20 and 35 years. At that age, the mothers were at the stage of productive age to work and often involved in social and religious activities that might be exhausting so that they paid less attention to their pregnancy condition. According to Perry *et al.*,<sup>15</sup> one of the risk factors causing prematurity was excessive physical activity of the mothers. Most of the subjects in this study had primary education level. This finding was consistent with the study by Castral *et al.*<sup>16</sup>. Education affected one's understanding to the new information and had a more positive attitude in receiving information<sup>17,18</sup>. The proportion of female LBW infant was higher in KMC group whereas the proportion of male LBW infant was higher in CMC group. Similar result was also found in the study by Samra *et al.*<sup>19</sup>.

Table 1 shows that most of the mothers in the KMC group gave birth by C-section while most of the mothers in the CMC group delivered normally. Based on a study by Cohen<sup>20</sup>, the high incidence of maternal stress after childbirth generally occurred among mothers with a normal delivery because the childbirth was not planned; thus, they were not ready physically or psychologically. Their unpreparedness had an impact on emotional stability and anxiety, which ultimately triggered the occurrence of stress. These results are in line with the present study and are shown in Table 3. The results of the current study showed that most mothers in the KMC group did not experience stress while those in the CMC group had stress (10 people had mild stress and two people had severe stress) (Table 3).

Mothers with parity 1 (primipara) are at risk of having LBW infants. It is related to the immature state of organ function in maintaining pregnancy and accepting the presence of fetus, maternal skills to perform self-care and baby care and unstable psychological state of the mothers<sup>21</sup>. Based on the study by Shajari *et al.*,<sup>21</sup> gestational age was an independent predictor of infant's birth weight. Birth weight is recognized as a reliable indicator of intrauterine development and one of the main factors to determine the child survival and future growth. Besides that, birth weight and birth length are essential indicators to monitor and evaluate maternal and child health program<sup>21</sup>.

In the first week, the proportion of mothers who did not experience stress in KMC group (70%) was almost twice higher than those in CMC group (40%). After the fourth week, all subjects in KMC group did not experience stress while subjects in CMC group still experienced mild stress (15%). These results were consistent with the previous study by Shiau<sup>9</sup> which showed that mothers practicing KMC had lower anxiety level than the ones not receiving KMC. Same results were also shown in the previous studies by Karimi *et al.*<sup>22</sup> and Nematbakhsh<sup>23</sup> where KMC practice could reduce maternal stress.

KMC is a method of care that involves the parents and their babies. Close skin contact will affect the psychological condition of the mother and reduce maternal stress. Physiological responses of this closeness is indicated by the hormonal changes which will influence the changes in stress levels. This assumption was based on the study by Padovani *et al.*<sup>24</sup> who found that the highest stress of the mothers with premature infants were infants' clinical conditions and the separation of the mothers from their babies. The separation was reduced and the closeness between the mother and her baby began to occur by KMC implementation.

Venancio and Almeida<sup>25</sup> stated that skin-to-skin contact between the mothers and their babies during KMC implementation was a stimulus that would be carried to the brain. This stimulus would then further trigger the release of oxytocin which had positive effect on the emotional state of the mother. Mothers who practiced KMC showed more stable emotion than the ones who didn't.

Inadequate interaction capabilities of the infants would affect the psychological condition of their parents. This result was consistent with the study by Brazelton and Nugent<sup>26</sup> who found that the ability to control stimulus in preterm infants was different with full-term infants. This inadequacy would affect the psychological condition of the parents because they did not understand their babies' conditions related to the interaction capabilities of the infants with their parents. Close position of the baby made the mother see the baby's condition herself.

## CONCLUSION AND RECOMMENDATION

Maternal and infants' characteristics in KMC and CMC groups were not significantly different, except for the type of childbirth. KMC practice significantly ( $p < 0.05$ ) reduced maternal stress level. KMC was an appropriate method of care for LBW infants to reduce postpartum maternal stress. Therefore, the mother and her closest relatives should always be given a counseling during hospitalization about the importance of KMC practice for preparing the independent care at home.

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