

# Effect of Kangaroo Mother Care on Physiological Parameters of Low Birth Weight Babies Admitted in NICU

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## Abstract

**Background:** Neonatal mortality is often associated with low birth weight (LBW) which is a common problem in India. Kangaroo Mother Care (KMC) is a special method of providing care to low birth weight babies where skin to skin contact is provided by placing a low birth weight (LBW) baby vertically between mother's breasts. The aim of the study is to assess and compare the effectiveness of Kangaroo Mother Care on Physiological Parameters of the LBW babies who were admitted in NICU of MMIMS&R hospital of Haryana.

**Materials and Method:** Quasi experimental one group pre test post test design was conducted. Total 30 LBW babies (<2000gm) were selected through purposive sampling. KMC was provided for one hour, three sessions per day for three consecutive days. The physiological parameters were assessed and compared on radiant warmer and immediately before, during and after KMC for 3 consecutive days.

**Results:** Findings of the study showed the statistical differences before and after the implementation of KMC. The comparison of physiological parameters (temperature, respiratory rate, heart rate and SpO<sub>2</sub>) means under radiant warmer and during KMC showed significant difference ( $p \leq 0.05$ ) on day 1, day 2 and day 3.

**Conclusions:** This study showed statistically significant difference in physiological parameters on all three days. Thus, KMC was found to be effective method in maintaining the stability of physiological parameters of low birth weight babies.

**Key Words:** Kangaroo Mother Care, Physiological Parameters, Low Birth Weight Babies

## Introduction

The first 28 days of life – the neonatal period – are the most vulnerable time for a child's survival. The level of low birth weight in developing countries (16.5%) is more than double the level in developed regions (7%). LBW is considered as the single most important

predictor of infant mortality, especially of deaths within the first months of life. A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or restricted fetal (intrauterine) growth.<sup>1</sup>

Preterm birth (born before 37 weeks of pregnancy) face many challenges to maintain their physiological parameters in extra uterine life which may lead to many complications.<sup>3</sup>

Thus, preterm infants need supplementary energy for the maintenance of stable physiological parameters, warmth, feeding, and to be infection free in their postnatal life. The insufficiency of thermal security is still a large scale threat for newborn survival in developing

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countries. Kangaroo Mother Care (KMC) is one of cost effective intervention which is very easy but more powerful method to reduce many complications mainly in low birth weight babies. Indian data on outcome of KMC are limited, though it has been found to be an effective and feasible method of care of LBW babies in hospital setting. <sup>5</sup> Thus researcher decided to conduct a study aimed at determining the impact of KMC on physiological parameters of LBW babies.

### Methodology

This quasi-experimental study, one group pre test post test design was conducted on 30 low birth weight babies admitted in NICU of Maharishi Markandeshwar Hospital Mullana Ambala. The sampling technique used was purposive sampling. The inclusion criteria were Low birth weight babies who were being nursed under radiant warmer and were hemodynamically stable Low birth weight babies (<2000g). Study excluded LBW babies having any severe life threatening respiratory, nervous, and circulatory and congenital anomalies and babies whose mothers do not consent for study.

In order to get the data, clinical profile of the LBW babies including gestational age, chronological age, birth weight, gender, mode of feeding and type of feed was used mothers were instructed about the procedure and taken informed assent. KMC was provided in three sessions each of one hour for three consecutive days. Physiological parameters (Axillary temperature, respiration rate (RR/ min), heart rate (HR/ min), and oxygen saturation(SpO<sub>2</sub>)) were recorded in three observations on radiant warmer before each session of KMC and also three observations of physiological parameters were monitored and recorded during each session of KMC for three consecutive days.

### Procedure

For implementing KMC, mothers were asked to use any front open light dress. Babies were dressed with cap, socks, and nappy and no other garments. After placing into a custom-made KMC bag, the baby was placed upright inside mother's clothing against bare skin of the chest and abdomen. Head was turned to one side and placed in a slightly extended position and eye to eye contact between mother and baby was encouraged. The hips were kept flexed and abducted in a 'frog' position; the arms were also flexed. Counseling and demonstration were repeated for initially hesitant mothers till they were able to offer KMC confidently and correctly.

To measure the temperature, digital thermometer was used. the temperature was recorded in °C. Heart rate and SpO<sub>2</sub> were recorded by using Pulse oximeter. Respiration was assessed by recording chest expansion and relaxation.

**Ethical considerations :** The *ethical clearance* was obtained from university research ethics committee of Maharishi Markandeshwar Deemed to be University Mullana, Ambala (MMDU/IEC/967). Informed consent was obtained from the mothers of Low birth weight babies.

### Results

The analysis was done by applying parametric tests after checking normalcy of the data by Shapiro Wilk Test. Descriptive and inferential statistics were utilized for data analysis. p value  $\leq 0.05$  was considered as significant for the present study. the paired 't' test was used to compare the means of vital signs on radiant warmer and during KMC. One way ANOVA was used to test the associations with selected variables of LBW babies. Complete data was available of 30 low birth weight babies were recruited at the level of 0.05 level of significance.

The results of the study showed that more than half of the Low birth weight babies (63.3%) were preterm, with chronological age between 5-10 days . Less than half (43.3%) weighed in between 1800-2000grams birth. Most of them were females (60%) and more than half (56.7%) were on

nasogastric/orogastric feeding and less than three fourth (73.3%) were getting expressed breast milk. [Table 1].

The comparison of the Physiological parameters between means on radiant warmer and during KMC on three consecutive days in three sessions per day showed statistically significant difference using the paired 't' test which showed that the Physiological parameters (Temperature, Heart Rate, Respiratory Rate & SpO<sub>2</sub> ) of LBW babies was more stable during KMC than on Radiant warmer (RW).(p $\leq 0.05$ )[Table2,3,4,5] on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> day respectively which indicates that the stabilization of physiological parameters during KMC in low birth weight babies was true difference and not by chance, suggesting that KMC was effective in stabilizing the temperature of low birth weight babies.

**Table 1: Frequency and Percentage Distribution of characteristics of LBW babies.**

Sr.no	Sample characteristics	Frequency%
<b>1</b>	<b>Gestational age</b>	
1.1	Term/Small for date	11(36.7%)
1.2	Preterm	19(63.3%)
<b>2.</b>	<b>Chronological age</b>	
2.1	<5 days	2(4.4%)
2.2	5-10 days	19(63.3%)
2.3	> 10 days	9(30%)
<b>3.</b>	<b>Birth weight</b>	
3.1	1800-2000gm	13(43.3%)
3.2	1200-1799gm	11(36.7%)
3.3	<1200gm	6(20%)
<b>4</b>	<b>Gender</b>	
4.1	Boy	12(40%)
4.2	Girl	18(60%)
<b>5</b>	<b>Mode of feeding</b>	
5.1	Breastfeeding	4(13.3%)
5.2	Nasogastric/orogastric feeding	17(56.7%)
5.3	Paladai/cup feeding	9(30%)
<b>6</b>	<b>Type of feed</b>	
6.1	Expressed breast milk	22(73.3%)
6.2	Formula milk	8(26.7%)

**Table 2: Determining and Comparing the Temperature average on Radiant Warmer (RW)and during KMC on day 1, day 2 and day 3 of KMC.**

TEMPERATURE (-C)			Mean	M <sub>0</sub>	SE M <sub>0</sub>	't' value	p value
DAY 1	Session I	RW	36.67				
		KMC	37.00	.33	.088	3.80	.001**
	Session II	RW	36.53				
		KMC	36.97	.43	.10	4.17	.000**
	Session III	RW	36.77				
		KMC	37.00	.26	.08	3.24	.003*
DAY 2	Session I	RW	36.67				
		KMC	37.00	.33	.08	3.8	.001*
	Session II	RW	36.7				
		KMC	36.09	.61	.09	1.72	.002*
	Session III	RW	36.53				
		KMC	37.03	.46	.09	5.03	.000*
DAY 3	Session I	RW	36.5				
		KMC	37.0		.05	1.79	.001*
	Session II	RW	36.73	0.5			
		KMC	37.1		.10	1.54	.003*
	Session III	RW	36.77	.63			
		KMC	37.07	.30	.08	3.52	.001*

t(29)≥2.045 NS -Not significant(p&gt;0.05)

\*significant (p ≤ 0.05)

**Table 3: Determining and Comparing the Respiratory Rate average on Radiant Warmer and during KMC on day 1, day 2 and day 3 of KMC.**

RESPIRATORY RATE			Mean	Mb	SE Mb	't' value	p value
DAY 1	Session I	RW	45.83	2.86	.07	3.84	.001*
		KMC	42.97				
	Session II	RW	42.20	2.36	.81	2.92	.007*
		KMC	39.83				
	Session III	RW	41.43	2.33	.91	2.56	.016*
		KMC	39.10				
DAY 2	Session I	RW	45.80	3.60	.69	5.19	.000*
		KMC	42.20				
	Session II	RW	41.50	1.80	.87	2.06	.048*
		KMC	39.70				
	Session III	RW	42.20	2.53	.89	2.99	.006*
		KMC	39.57				
DAY 3	Session I	RW	45.87	2.53	.80	3.16	.004*
		KMC	43.33				
	Session II	RW	42.63	2.76	.90	3.07	.005*
		KMC	39.87				
	Session III	RW	41.17	1.96	.96	2.04	.050*
		KMC	39.20				

$t(29) \geq 2.045$  NS -Not significant ( $p > 0.05$ )

\*significant ( $p \leq 0.05$ )

**Table 4: Determining and Comparing the Heart Rate average on Radiant Warmer and during KMC on day 1, day 2 and day 3 of KMC.**

RESPIRATORY RATE			Mean	Mb	SE Mb	't' value	p value
DAY 1	Session I	RW	45.83	2.86	.07	3.84	.001*
		KMC	42.97				
	Session II	RW	42.20	2.36	.81	2.92	.007*
		KMC	39.83				
	Session III	RW	41.43	2.33	.91	2.56	.016*
		KMC	39.10				
DAY 2	Session I	RW	45.80	3.60	.69	5.19	.000*
		KMC	42.20				
	Session II	RW	41.50	1.80	.87	2.06	.048*
		KMC	39.70				
	Session III	RW	42.20	2.53	.89	2.99	.006*
		KMC	39.57				
DAY 3	Session I	RW	45.87	2.53	.80	3.16	.004*
		KMC	43.33				
	Session II	RW	42.63	2.76	.90	3.07	.005*
		KMC	39.87				
	Session III	RW	41.17	1.96	.96	2.04	.050*
		KMC	39.20				

t(29)≥2.045 NS -Not significant(p&gt;0.05)

\*significant (p ≤ 0.05)

**Table 5: Determining and Comparing the SpO2 average on Radiant Warmer and during KMC on day 1, day 2 and day 3 of KMC.**

HEART RATE(b/min)			Mean	Mb	SE Mb	't' value	p value
DAY 1	Session I	RW	151.23				
		KMC	137.23	14.00	12.48	1.08	.000*
	Session II	RW	136.37				
		KMC	132.57	3.80	2.42	5.65	.000**
	Session III	RW	135.07				
		KMC	130.73	4.33	2.01	3.82	.001*
DAY 2	Session I	RW	135.45				
		KMC	133.50	1.96	.80	3.47	.002*
	Session II	RW	134.20				
		KMC	130.97	3.29			
	Session III	RW	132.20		1.45	3.70	.001*
		KMC	129.70	2.50			
DAY 3	Session I	RW	133.77		0.82	3.05	.005*
		KMC	134.90				
	Session II	RW	134.10	1.13	2.64	1.53	.13 <sup>NS</sup>
		KMC	131.67				
	Session III	RW	133.37	2.43	1.33	.50	.000**
		KMC	129.43				
				3.93	1.46	3.25	.003*

t(29) ≥ 2.045 NS -Not significant (p > 0.05)

\*significant (p ≤ 0.05)

## ❖ UNITS USED

°C. DEGREE CELCIUS

## ❖ ABBREVIATIONS USED

1. KMC: KANGAROO MOTHER CARE
2. LBW: LOW BIRTH WEIGHT
3. RW: RADIANT WARMER
4. NICU: NEONATAL INTENSIVE CARE UNIT
5. RR: RESPIRATORY RATE
6. HR: HEART RATE

## Discussion

The study results showed a significant increase in the average temperature in the LBW babies in the 1st to 3rd days after KMC, the findings are consistent with the results of many studies in

this regard. Only a study, before and after, showed that the newborns temperature reduced during KMC compared to the incubator care, although the temperature rates were in the normal range. Sontheimes et al . showed that even in newborns transferring with KMC compared to incubator care, the HR, respiratory rate, arterial oxygen saturation rate, and the temperature remain constant.<sup>6</sup> Hence, we can say that the KMC leads

to the temperature stability or its increase in the normal range. Indeed, putting the newborn in skin contact with the mother will prevent the heat loss. Increasing temperatures, particularly for low birth weight and premature newborns with tendency to hypothermia is very useful and improves the treatment outcomes, while the metabolic rate and oxygen consumption increase with the heat loss and lead to physiological and metabolic instability, homeostatic problems, apnea intensifying, and impaired weight gain.<sup>7</sup>

The research results showed a significant increase in oxygen saturation rate during the 1st to 3rd days after KMC compared to radiant warmer which is consistent with the results of many studies. Increase in arterial oxygen saturation rate can be due to calm and comfortable contact of the newborn with the mother and possibly the reduced oxygen consumption.<sup>8</sup>

In a number of clinical trial studies on similar preterm subjects, no changes have been reported in the rate of arterial oxygen saturation during KMC. Furthermore, in a study, no change was observed in the rate of arterial oxygen saturation in preterm neonates on heel prick and during puncturing the heel stick during the KMC than to the incubator cure.

Some researchers mentioned that during neonatal transportation toward the KMC, SpO<sub>2</sub> may decrease, statistically, but not clinically, significant and will become normal within three minutes of KMC. Nonetheless, head in upright position is important to maintain the oxygen saturation<sup>9</sup>.

The findings of the present study were also found to be consistent with the study conducted by Dr. Deepa.S.Phirke, Dr Sudhakar Bantewad to evaluate the effect of KMC on low birth weight babies, where the change in temperature ranged from -2 to +2oF and 78 babies had increased in temperature. The change in heart rate (HR) ranged from 3 to 12 beats/min. 73 babies had decreased heart rate. The range of change in respiratory rate (RR) was 3 to 8 per minute. Total 75 babies had a decreased RR. The change in SPO<sub>2</sub> was 3 to 8 and total 78 babies showed an increase in the SPO<sub>2</sub>. The mean of HR was 146.95 and 139.55, For RR 45.96 and 40.175, for temperature 97.69 and 98.50 and was 93.55 -97.48 for SPO<sub>2</sub> before and after receiving KMC respectively .P value was <0.0001 in all parameters.<sup>10</sup>

## Conclusion

The results of the study concluded that that the KMC contributes in stabilizing the physiological parameters (the temperature, cardiovascular and respiratory stability) of LBW babies.

### Recommendations:

- A study to evaluate the effectiveness of KMC on high risk newborn in terms of neurobehavioral outcomes.

- A follow up study can be conducted to assess the long term effects of Kangaroo mother care.

- A qualitative study can be conducted to assess the barriers faced by nurses and mothers in implementation of KMC.

- A exploratory study can be conducted to find out the prevalence and duration of KMC practice in the selected hospitals of Haryana.

- A comparative study can be conducted to assess the effectiveness of KMC versus coconut oil massage on multiple variables for viz. Stability of physiological parameters, weight gain, sepsis, feeding behavior, apnea, duration of stay in hospital etc.

A mixed approach study can be conducted on impact of frequency and duration of KMC on maternal and neonatal outcomes of LBW babies.

### Limitations:

The study is confined to a small number of sample. This limit the generalization of the findings to study samples only.

Monitoring of physiological parameters during KMC .Researcher must had let the mothers and baby undisturbed during KMC sessions.

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