

ORIGINAL ARTICLE

Benefits of Kangaroo Mother Care for the “Larger” Low Birth Weight Infant (> 2000g)

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Abstract

Introduction: Prematurity and low birth weight (LBW) are major factors in neonatal mortality and neurodevelopmental disability. Kangaroo Mother Care (KMC), combining skin-to-skin contact and exclusive breastfeeding, is effective in LBW infants. The 2022 WHO recommendations expanded KMC to infants up to 2500 g, prompting this study to assess its impact, particularly on “larger” LBW infants.

Methodology: This was an observational study carried out in a South Indian tertiary care hospital included infants (750-2500 g) clinically stable for KMC. Physiological parameters were monitored during KMC and conventional care. The study group was stratified by birth weight (Group A: 750-1499 g, Group B: 1500-1999 g, Group C: 2000-2499 g).

Results: Out of 91 cases, the study showed a significant rise in respiratory and heart rates during KMC across all groups. Temperature increased significantly, with the largest rise observed in the “larger” LBW infants (Group C), reducing hypothermia risk by 77%. The incidence of mild hypothermia was notably reduced in all groups during KMC, with the “larger” LBW infants (Group C) experiencing the most substantial reduction. The prevalence of mild hypothermia in this group decreased by 39%, highlighting the effectiveness of KMC in mitigating hypothermic conditions in larger LBW infants.

Discussion: The study highlights KMC's effectiveness in preventing hypothermia in larger LBW infants, aligning with 2022 WHO guidelines. The temperature rise was more significant in postnatal wards, reinforcing KMC's benefits for infants >2 kg.

Conclusion: KMC postnatal wards. The study underscores the need for KMC adoption in postnatal care, highlighting its benefits for larger LBW infants.

Keywords: Kangaroo mother care, Low birth weight, Neonatal care, Hypothermia WHO recommendations

Introduction

Prematurity (gestational age less than 37 weeks) and low birth weight (LBW), defined as less than 2500g,

are significant contributors to neonatal and infant mortality as well as long-term neurodevelopmental disabilities.¹ Survivors often face ongoing morbidities

requiring long-term care, burdening health and social systems. Infants with LBW who are born preterm, small for their gestational age, or both constitute approximately 15% of all neonates worldwide, among this group the late preterm babies and babies with birth weight of 2000 to <2500 g constitute approximately 70% of this population.^{2,3}

“Kangaroo mother care,” (KMC) which includes continuous skin-to-skin contact of the infant with the mother and exclusive breastfeeding or breast milk feeding is among the most effective interventions for preventing death in infants with LBW.⁴

KMC was formally introduced in 1978 by Dr. Edgar Sanabria, a neonatologist in Colombia, as an alternative to incubators in resource-limited settings. KMC is a simple, cost-effective intervention that has been proven to reduce neonatal mortality and the risk of infections in LBW infants.⁵ A 2016 Cochrane review reported that KMC, when initiated after the stabilization of infants with a birth weight below 2000 g, leads to a 40% relative reduction in mortality risk by the time of discharge or 40-41 weeks postmenstrual age, along with a 33% reduction in the risk of death.⁶

The WHO's highlights KMC as a transformative healthcare innovation, positioning mothers, newborns, and families at the core of maternal-newborn service delivery.⁷ Temperature regulation and maintenance of lactation by KMC may be life saving for pre-term infants.⁵ For decades, KMC was recommended for < 2000 g infants in facilities as soon as the babies were clinically stable however as per the latest WHO recommendation KMC is now recommended for the babies with birth weight < 2500 g.³ However, KMC for all stable LBW infants has been a norm in our hospital. The beneficial effects of KMC on morbidities like hypothermia in this subgroup of “larger” LBW infants i.e, >2000 g is not well elucidated.⁸

The need for this study arises from the limited data on the effect of KMC on physiological parameters and the incidence of hypothermia in all LBW infants, particularly the “larger” LBW infants weighing more than 2000g. Our study aimed to address this gap by evaluating the impact of KMC on these outcomes. We hypothesized that KMC would effectively reduce the incidence of hypothermia in all LBW infants, including those in the >2000 g weight category.

Materials and Methods

This observational analytic study was conducted in a tertiary care teaching hospital in South India over a duration of 16 months. Neonates weighing between 750 g and 2500 g, who were clinically stable, on oral or gavage feeds, and initiated into KMC were included. Critically ill neonates requiring ventilatory support and those with life-threatening congenital malformations were excluded. Written informed consent was obtained from mothers practicing KMC before enrolling them in the study. The study group was stratified based on birth weight into three categories: Group A (750-1499 g), Group B (1500-1999 g), and Group C (2000-2499 g).

The baby dressed only in a diaper and a cap, was placed between the mother's breasts, in skin to skin contact. The head was turned to one side and extended slightly, and the arms were flexed. A shawl/dupatta was used to secure the baby in place against the mother's chest, ensuring that the head was supported. The neonates received intermittent KMC. They were monitored during conventional care and during KMC. The babies served as their own controls. Conventional care included care in incubator, radiant warmer or a warm cradle in the NICU and rooming in with the mothers in the post-natal ward.

All babies had their heart rate (HR), respiratory rate (RR), and temperature recorded during KMC and during conventional care. A minimum of 2-3 observations during 2-3 KMC sessions were recorded for each baby. The heart rate and respiratory rate were recorded by auscultatory method. The temperature recordings were done in the axilla using a digital thermometer (Besmed) for 1 minute. Babies in NICU had their oxygen saturation recorded in addition to the above parameters. Saturation was measured with a pulse oximeter (Masimo) through a probe. Alarm limit was set at 85% for low oxygen saturation.

Babies were weighed naked on a daily basis using an electronic weighing scale (Karuka, USA). The duration of KMC was recorded by the mother or nurse. The heart rate, respiratory rate and temperature during KMC and conventional care were compared.

Ethical Considerations: The study received approval from the Institutional Ethical Committee. Written informed consent was obtained from all participants prior to their inclusion in the study.

Statistical analysis

A sample size of 30 neonates in each group was chosen as a sample of convenience. The sampling method employed was consecutive sampling of neonates meeting the inclusion criteria. A Student's t-test was used to compare the observed values between the KMC group and the conventional care group, with a *P*-value of <0.05 considered statistically significant and a confidence interval of 95%. Data analysis was performed using the SPSS version 12 software package.

Results

A total of 91 cases were recruited for the study out of 922 low birth weight (LBW) babies born during the recruitment period. Of these, 188 babies weighed between 750-1499 g (Group A), 217 weighed between 1500-1999 g (Group B), and 517 weighed between 2000-2500 g (Group C) (Figure 1).

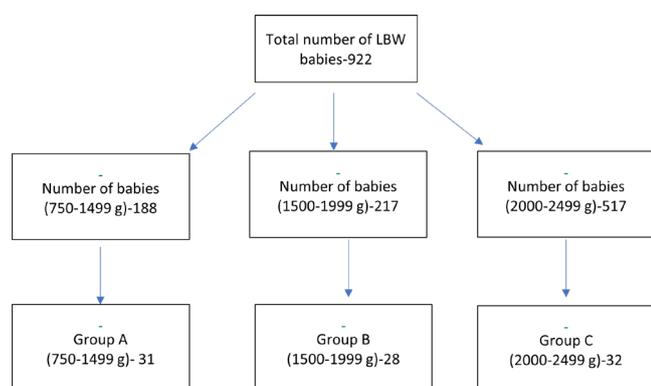


Figure 1: Study Flow Chart

The baseline characteristics of the infants in the study population are presented in Table 1. All infants in Group A (31) were nursed under a radiant warmer during conventional care. In Group B, 23 infants were nursed under radiant warmers, while 5 were cared for at the mother’s side. In Group C, all 32 infants were cared for at the mother’s side in the postnatal wards.

Table 2 illustrates the physiological parameters of the study infants during KMC and conventional care. A significant difference was observed in the respiratory rates across all groups during KMC compared to conventional care, with respiratory and heart rates increasing during KMC intervention. KMC also demonstrated an improvement in temperature across all three groups.

As shown in Table 3, among the three groups, the rise in temperature was most notable in Group C (2000-2500 g), with an increase of 0.70°C, which was statistically significant (*P*<0.001). In contrast, the temperature increase was 0.3°C in Group A and 0.4°C in Group B. The incidence of mild hypothermia was reduced across all groups with KMC, with the largest reduction seen in the “larger” LBW infants (Group C), who exhibited a higher incidence of cold stress compared to smaller LBW infants nursed in the NICU. Additionally, oxygen saturations were consistently higher in the KMC group.

Table 1: Baseline variables

Demographic data	Group A (750 - 1499 g)	Group B (1500- 1999 g)	Group C (2000- 2499 g)
Number of patients (n)	31	28	32
Gestational age (weeks)	31.7 weeks	35.3 weeks	37.3 weeks
Birth weight (g)	1145+147	1734+148	2252+123
Male n (%)	18(58%)	13(46%)	14(44%)
Female n (%)	13(42 %)	15(54%)	18(56%)
Maternal age (year)	22.3	24.8	24.3
Mode of Delivery			
NVD n (%)	10 (32%)	14 (50%)	16 (50%)
LSCS n (%)	21 (68%)	14 (50%)	16 (50%)
Education			
Illiterate/ incomplete schooling n (%)	3(9.6 %)	9(33.3%)	13(40%)
SSLC/PUC/Graduation / Post Graduation n (%)	28(90.6%)	19(66.6%)	19(60%)

Table 2: KMC and Physiological parameters

	KMC	Conventional care	P value
Temperature in °C			
Group A	37.1±0.24	36.8±0.26	<0.001
Group B	37±0.13	36.6±0.55	<0.001
Group C	37±0.32	36.3±0.47	<0.001
Respiratory rate b/ min			
Group A	63.4±9.2	54.1±7.9	<0.001
Group B	57.3±8.5	46.8±8.1	<0.001
Group C	52.3±7.2	40.4±7.3	<0.001
Heart rate b / min			
Group A	170.2±12.2	149±14.6	<0.001
Group B	157.2±11.9	133.9±15.5	<0.001
Group C	144±8.85	121.2±8.1	<0.001
SpO ₂ *			
Group A	95.1	94.7	0.017
Group B	96	95	0.054

*SpO₂ was measured only in groups A and B in NICU

Table 3: KMC and Hypothermia

	KMC	Conventional care	P value
Episodes of mild hypothermia or cold stress			
Group A	1	4	<0.001
Group B	1	11	<0.001
Group C	1	40	<0.001

Discussion

The 2022 WHO guidelines for the care of preterm or low birth weight infants introduce significant updates to the recommendations regarding KMC. The four major changes include initiation of KMC for the unstable newborn immediately after birth, initiation of KMC in the community or the facility, a recommendation to provide at least 8 hours of KMC per day and to ALL LBW infants and not limited to < 2000 g. Of these four changes, the biggest impact in terms of number of babies eligible for KMC is the recommendation to provide KMC to all LBW infants, even the “larger LBW babies > 2000 g, as the number of babies in this weight category is three - four times the number of LBW < 2000 g.

This study highlights the benefits of KMC in preventing hypothermia in the “larger” group of LBW infants with birth weight > 2000 g in routine postnatal ward settings.

Neonatal hypothermia is a serious condition and may be a cofactor of mortality and several morbidities. The recent meta-analysis including 11 studies and 1169 infants, has shown a remarkable reduction of 68% in hypothermia with RR 0.32 (95% CI 0.19, 0.53). In the present study, there was a significant rise of temperature in all the groups when the babies were undergoing KMC as compared to conventional care. While this is a well proven fact that has been shown earlier in several studies including by Bonhorst *et al.*, Bauer *et al.*, and Fohe *et al.*, which have demonstrated a significant rise in body temperature after KMC ranging from 0.3 °C to 0.6 °C rise, this study showed that the rise in temperature was greater in the larger LBW (group C) who were in the postnatal ward. KMC, as a hypothermia preventing tool, was most effective in this category of larger LBW babies reducing the risk of hypothermia

by 97%, RR - 0.025 (CI; 2.049 - 3.424).^{9,10,11} This is most likely due to the fact that babies < 2000g i.e., groups A and B in this study were cared for in the NICU under radiant warmers or incubators, while the LBW babies > 2000 g were cared for with the mother in the postnatal wards without any external heating source. This emphasises the usefulness of KMC in preventing hypothermia in LBW babies > 2000 g. Hypothermia is a hidden problem in this group of apparently well LBW babies and contributes to hypoglycaemia, poor weight gain and poor feeding and possibly to mortality.

The community-initiated KMC trial, the largest randomized controlled trial in KMC to date, has shown mortality reduction up to 40% in LBW babies > 2000 g and has been the basis on which the new WHO recommendations are made. The magnitude of mortality reduction was similar for infants born ≤ 34 weeks of gestation and those born > 34 to 36 weeks of gestation and in infants with weight ≤ 2000 g vs infants with birth weight > 2000 g but < 2500 g at birth or enrolment.^{8,12} The stabilization of other physiological parameters namely, heart rate, respiratory rate and saturations conform to the results of other studies of KMC on physiological parameters. This is one of the few studies studying the effect of KMC in “larger LBW” and emphasize the importance of adhering to the new WHO recommendations i.e., KMC for ALL LBW or preterm infants increasing the coverage of KMC to include the “large” LBW babies in the postnatal ward.¹² This has implications especially in public health considering that LBW infants between 2000 -2500 g constitute 60-75% of all LBW infants. All postnatal wards where these babies are cared for need to be provide KMC services with provision for semi reclining beds, KMC chairs, binders and must welcome surrogates to support mother in providing prolonged KMC (at least > 8 hours/ day). Most postnatal wards are managed by obstetric nurses whose focus in on maternal care. The postnatal ward nurses need to be trained and supported to make KMC the focal point around which the entire maternal-newborn service delivery is organized as is envisaged by the global position paper on KMC.⁷

This study has certain limitations. The sample size was relatively small, and the observation period was limited to 2-3 KMC sessions. Additionally, clinical outcomes beyond hypothermia were not assessed, and the duration of KMC was particularly short in Group C.

Despite these constraints, the findings highlight a substantial reduction in hypothermia, especially among the (LBW) infants, demonstrating the potential benefits of Kangaroo Mother Care even within a limited observation period.

Conclusion

Kangaroo mother care is recommended for all low birth weight infants including the larger LBW infants > 2000 g in whom it is an effective tool to reduce hypothermia in the postnatal wards.

Conflict of interests

None

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