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A Prospective Study on Impact of Kangaroo Mother Care Among Low-Birth-Weight Babies in a Tertiary Care Hospital in Eastern India

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Abstract

Introduction: KMC has been documented as a safe and effective alternative method of care of low birth weight (LBW) babies in developing as well as developed countries to meet the baby's need for warmth, breast feeding, protection from infection, stimulation, safety and love; improving maternal confidence and lactation and promoting early hospital discharge. [1] In terms of cost and impact on neonatal survival, it has comparative advantages over the conventional method of care (CMC). [2] But still KMC is not a widely practiced method of care of LBW babies in India. This study aimed at reviewing the evidence concerning the progress of KMC implementation and its health benefits especially in India. ***Methods:*** A prospective cohort study including inborn babies with birth weight <1800g with their mothers/ care givers was conducted at SNCU, Medical College, Kolkata over a period of 1 year from January to December 2023. Babies with hemodynamic instability and major congenital anomalies were excluded from the study. ***Results:*** 480 LBW (<1800g) babies were followed till discharge or 40 week post menstrual age, which ever was earlier. The babies having KMC had significant reduction of hypothermia (p value 0.03) and incidence of sepsis (p value 0.003). KMC was found to be associated with a significant reduction in the risk of mortality (RR 0.7). KMC group had earlier initiation of breastfeeding (mean difference 3 days), increased rate of daily weight gain (mean difference 5.61 g/day), earlier regaining of birth weight (mean difference 5.22 days) and decrease in duration of hospital stay (mean difference 2 days). ***Conclusion:*** This study supports the use of KMC in LBW (<1800g) as an adjunct to conventional neonatal care mainly in resource limited settings. KMC has significant positive impact on initiation and sustaining breast feeding, growth parameters and mother infant bonding.

Keywords: Low birth weight babies, breastfeeding, duration of hospital stay, neonatal mortality, developing countries.

INTRODUCTION

KMC was first initiated in 1978 in Bogotá (Colombia) following the challenges of overcrowding and limited resources in NICU which resulted in high morbidity and mortality among LBW infants; the intervention comprised continuous skin-to-skin contact between the mother and the infant, exclusive breastfeeding, and promoting early home discharge in the kangaroo position accompanied with follow-up.[1,3] Thermo- regulation is the ability to maintain a balance between thermogenesis and thermal loss in order to regulate body temperature within a specific normal range.[4] In the newborn infant, thermoregulation is a critical physiologic function which is strongly affected by physical immaturity, disease severity, and environmental factors. [5] Physiologically, the neonate is susceptible to cold stress because of the following factors: higher ratio of body surface area (promotes thermal loss) to body volume (proportional to thermogenesis), paucity of thermal insulation from subcutaneous fat, poor muscle bulk and inability to shiver, as well as under developed nervous system with poor response to cold.[5] Cold stress (hypothermia) portends grave metabolic consequences for all neonates: especially the preterm and LBW babies who are more vulnerable to the consequences, leading to increased morbidity and mortality rates. Thus, preventing hypothermia is vital to neonatal survival and long-term outcome. The thermoneutral environment refers to the environmental air temperature at which an infant with a normal body temperature has a minimal metabolic rate and therefore minimal oxygen consumption. As a fundamental component of neonatal care, the maintenance of the thermoneutral environment is therefore the ultimate goal of neonatal temperature control and management.

Worldwide more than 20 million babies are born each year with low birth weight (LBW) either because of preterm birth or impaired prenatal growth.[1] These babies require intensive neonatal nursing care from often limited resources at a vast expense. Substantial progress has been made in its implementation in many developing countries where facility-based KMC has been institutionalized. [2]

KMC is not a widely practiced method of care of LBW babies in India. This study is aimed at reviewing the evidence concerning the progress of KMC implementation and its health benefits especially in India.

Aims & Objectives:

To assess the effects of KMC as an adjunct to conventional neonatal care among LBW babies (<1800 g), in a tertiary care centre in India in terms of incidence of

(a) Hypothermia
(b) Apnoea
(c) Age at initiation of breast feeding
(d) Rate of weight gain
(e) Incidence of sepsis
(f) Duration of hospital stay

MATERIALS & METHODS

Place of study: SNCU, Medical College, Kolkata
Study design: Prospective Cohort study
Duration of study:1 year (January–December 2023)

Study subjects:

Inclusion criteria:

Inborn babies with birth weight <1800g after initial stabilization. Babies on NG feeding, IV fluids and medications and nasal cannula oxygen at <2L/min were included in the study.

Exclusion criteria:

1. Babies with major congenital anomalies
2. Babies with neonatal jaundice who needed continuous phototherapy
3. Hemodynamically unstable babies on inotropes
4. Babies needing respiratory support

An informed consent was taken from the mother in the local language. KMC was provided for at least 6 hr/day. A control group was selected with similar baseline characteristics using systematic random sampling. The babies in the control group i.e. the non KMC group received conventional neonatal care.

Study instrument:

Pre designed proforma, electronic weight machine and measuring tape were used. Babies were tied on the mother/caregiver's bare chest with soft cotton saree duly folded and adjusted as per comfort of both mother and the baby.

Requirements for implementation of KMC.

(a) Spacious room with easy access for mothers/ caregivers were available
(b) Comfortable reclining chairs in the breastfeeding room were arranged
(c) Nursing staff were specially trained in KMC & breastfeeding together with Facility based newborn care.
(d) Daily weight monitoring was done in digital weighing scale
(e) Good quality follow-up service was provided after discharge from SNCU at the High-risk clinic.
(f) Willingness and family support

Data thus obtained was tabulated and analyzed using percentage, relative risk (RR), arithmetic mean, mean difference and fisher's exact test with 2x2 contingency table.

RESULTS

240 LBW babies with birth weight <1800 g were included in the KMC group and 240 LBW babies with similar baseline characteristics were included in the control group receiving conventional care.

Table 1: Baseline characteristics of the study groups

Mean gestational age (weeks)	**31(range 27-37)**
Mean birth weight (g)	1320 (range 960 – 1800)
Mean age of starting of KMC (days)	6.5(range 3 – 12)

Mean gestational age of the study group was 31 weeks (range 27-37wk) and mean birth weight was 1320 g (range 960g-1800 g). Mean age at starting KMC was 6.5 days, Table 1. The babies having KMC had significant reduction of hypothermia (p value 0.03) and incidence of sepsis (p value 0.003). There was substantial reduction in incidence of apnea in the KMC group (p value 0.07) but it was not statistically significant, Table 2. The study has also documented earlier initiation of breast feeding (mean difference 3 days) Figure 1, increased rate of daily weight gain (mean difference 5.61 g/day) Figure 2, earlier regaining of birth weight (mean difference 5.22 days) Figure 3 and decrease in duration of hospital stay (mean difference 2 days) Figure 4. There was overall development of confidence in the mothers in taking care of her baby.

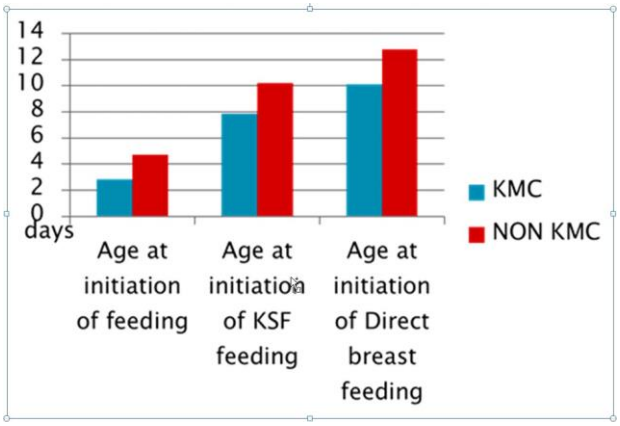

Fig. 1. Effect on age at initiation of breast feeding

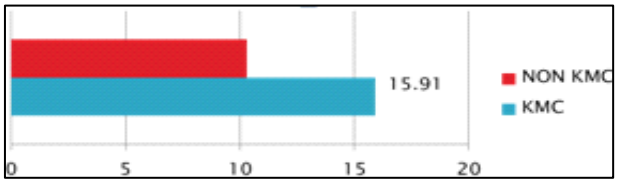

Fig. 2. Rate of daily weight gain (g/day)

Table 2: Impact of KMC in LBW babies (<1800 g)

		KMC group	Non KMC group	p value
Hypothermia	Present	75	130	0.03
	Absent	165	110	
Sepsis	Present	60	135	0.003
	Absent	180	105	
Apnoea	Present	15	50	0.07
	Absent	225	190	
		KMC group	**Non KMC group**	**Mean difference**
Age at initiation of breast feeding (days)		10	13	3
Rate of daily weight gain(g/day)		15.91	10.3	5.61
Age to regain birth weight (days)		19.72	14.5	5.22
Duration of hospital stay (days)		19.2	17.2	2

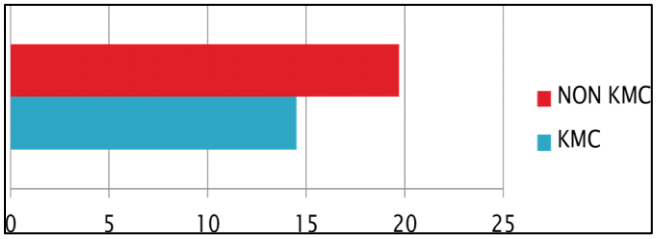

Fig. 3: Age at regaining birth weight

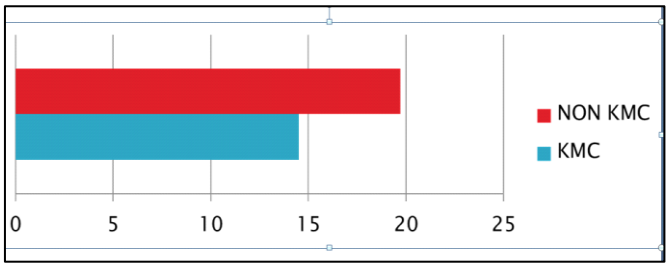

Fig. 4: Duration of hospital stay (days)

At discharge or 40 week post menstrual age KMC was found to be associated with a significant reduction in the risk of mortality (RR 0.7).

DISCUSSION

In an early Cochrane systematic review conducted on the impact of KMC on morbidity and mortality in LBW infants, the authors concluded that although KMC appeared to minimize severe infant morbidity without any reported harmful effect, there was no ample evidence yet to recommend its routine use in LBW infants. [6] Evidence from the subsequent updated reviews by these authors supports the use of KMC in LBW infants as both as an adjunct and a substitute to conventional newborn care particularly in resource-limited settings. [7-9] studies in different parts of the developing world have clearly shown these health benefits for LBW infants to include better survival outcome, increased growth parameters, and reduced duration of hospitalization as well as sustenance of exclusive breastfeeding. In southern Africa, a study which was conducted in a Mozambican hospital without facilities for intensive care, revealed that KMC was a feasible and appropriate method of care.[10] The authors observed that out of 32 hospitalized LBW infants weighing =1.8 kg, survival was 73% in 22 KMC and 20% in 10 non-KMC infants. The findings of this study underscore the role of KMC in improving the mortality and morbidity outcomes in LBW infants. Furthermore, the findings of the Cochrane review which synthesized data from21 studies comprising 3,042 LBW infants weighing =1.5 kg lend credence to this role, as the review reported reduced risk of mortality, hospital-acquired infection, and hypothermia coupled with increased anthropometric parameters and rates of breastfeeding among these infants. In India, a randomized control study of 28 stabilized very LBW neonates weighing <1.5 kg was conducted to determine the effect of KMC on breastfeeding rates, weight gain, and duration of hospitalization. Two groups, the kangaroo group (n=14) and the control group (n=14) were subjected to KMC and CMC, respectively. Remarkably, the neonates in the kangaroo group significantly showed better weight gain after the first week of life and earlier hospital discharge compared to the control group. In addition, the number of mothers who exclusively breastfed their babies at 6-week follow-up was twice more in the kangaroo group than in the control group. Thus, the authors also concluded that the demonstrable effectiveness of KMC in improving neonatal outcome measures in LBW infants makes it an excellent adjunct to CMC in a nursery. [11]

In another related study in India, Suman *et al* compared the effect of KMC and CMC on growth parameters in 206LBW infants weighing <2 kg at birth. These neonates were randomized into two groups: the intervention group (n=103) who received KMC and the control group (n=103) who received CMC. Babies in the intervention (KMC) group significantly had better average weight gain per day, and higher weekly increments in head circumference and length. Furthermore, a significantly higher proportion of babies in the control group experienced hypothermia, hypoglycemia, and sepsis. More KMC babies were exclusively breastfed at the end of the study compared to their counterparts. Obviously, KMC did not only improve growth but was also shown to reduce morbidities in LBW infants.[12] This study also showed similar results. Figure 5 shows Mother providing Kangaroo Mother Care.

Fig. 5: Mother providing Kangaroo Mother Care

CONCLUSION

KMC was found to be very much beneficial in management of LBW babies as an adjunct to conventional neonatal care in resource limited set up. KMC is imperative to boost caregiver confidence and experience using dedicated spaces in the hospital, as well as dedicated staff meant for adequate ambulatory follow-up and continuous health education. Capacity training for health professionals and provision of space and infrastructure thus constitute the basic needs which could be funded by International Aid Agencies in order to scale up the program in these settings.

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