Research Article

Effect of kangaroo mother care in the management of low birth weight babies one year randomized controlled trial at NRI hospital

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Abstract

Introduction: Hypothermia and infections are frequently factors for poor outcome of premature /LBW babies. **Methods**: A one year randomized controlled trial was conducted among 60 neonates born and admitted in NICU, department of paediatrics, NRI medical college, Guntur. Mothers with LBW infants were enrolled after taking informed consent. Babies were randomised into KMC group and CMC group with 30 babies in each group. In both groups, physiological stability, growth, promotion of breast feeding, bonding and confidence of mothers in taking care of their LBW babies were assessed. Both groups were followed till they reached 2.5 kg on scheduled visits. **Results:** In the present study, it was observed that all babies of KMC maintained temperature in normal range. 36.5 to 37.5 compared to 86.6% of control babies. The mean weight gain (15.73 gm in KMC versus 11.63 gm in CMC, P< 0.0001) and mean head circumference at 2.5 kg, (34.440.5+4 cm in KMC VS 33.220+54 cm 33.221.0+5 cm in CMC), p< 0.0001 were significantly higher in KMC group. There was no significant difference in mean length between both the groups. The confidence level of mothers in caring for their LBW infants was significantly higher in KMC group p< 0.0001. **Conclusion:** KMC is a cost effective, safe, most acceptable method of caring for LBW babies.

Keywords*:* breast feeding, bonding, confidence of mothers, kangaroo mother care, low birth weight, temperature regulation.

Introduction

Low birth weight continues as an important social health problem. About 20 million LBW babies are born each year worldwide [1] in India; 8 million LBW babies are born each year. LBW /preterm babies are associated with high neonatal/infant mortality and morbidity [2, 3]. Of the estimated 4 million neonatal deaths, LBW/ preterm babies account for more than 8 lakhs [4]. Frequently incubators separate mothers from babies interfering thus in bonding [5]. KMC is an effective way to meet LBW baby's need for warmth growth and well being, breast feeding, protection from infection, stimulation, safety and love.

Kangaroo mother care was first suggested in 1978 by Dr. Edgar Rey in Bogota, Columbia. Since then many KMC modules have been developed. Kangaroo mother care is a special way of caring for LBW/preterm infants through skin to skin contact with the mother. It is a powerful and easy to use method to promote the health and well being of babies born with low birth weight, preterm or full term [6]. Its key features are:

-easy continuous and prolonged skin to skin contact between mother and baby.
-exclusive breast feeding
-initiated at hospital and continued at home.
Small babies can be discharged early.
This randomised controlled trial is to assess the effect of KMC in LBW babies over conventional care.

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Materials and Method

The present study was conducted among the newborns born and admitted in NICU, department of paediatrics, NRI general hospital. It was a one year randomised controlled trial at hospital. All newborn or admitted children with birth weight <2200 gms who were stable

and able to take feeds were included. The sample size was 30 in each group. The participants were randomised into kangaroo mother care (KMC) group and conventional method of care (CMC) group using computer generated randomisation list. All critically ill babies, requiring ventilator support, critically ill mothers who were unable to remain with their babies were excluded. Written informed consent of mothers who were willing to participate in the study was taken. The mothers were counselled regarding the study, and the participants were randomised into KMC group and CMC group. Mothers of both the groups were educated regarding maintenance of basic standards of hygiene, daily bath, clean clothes.

Mothers of KMC group were taught to hold the infant, after dressing the baby. Babies were dressed in socks, cap and soak proof diaper, a front open shirt. Baby was placed in kangaroo bag designed by KEM, Mumbai. Mothers were shown to hold the baby with one hand placed behind the neck and back to prevent flexion of head, the other hand was placed under baby's buttocks.

Babies were placed in kangaroo position as

1. Baby was in upright position facing the mother's chest.
2. Baby's chest was exposed for skin to skin contact with mother.
3. Head was turned to one side and was in slight extension.
4. Hips were flexed and extended in a frog position.
5. Baby was placed in between mother's breasts.
6. Baby was secured with the help of a kangaroo bag.
7. Loop around the neck was suitably adjusted.
8. Belts were tied according to the comfort of mother and baby. Safety was given undue importance while securing the baby.

Babies were continually kept in skin to skin contact as long as possible for a minimum of 13 to 14 hours per day. They were removed only for changing diapers, clinical assessment, as needed. Mother carrying a baby in KMC position was advised to walk, sit, stand or engage in recreational activities. Mothers were encouraged to share their concerns and fears to reduce her anxiety. In conventional method of care, babies with birth weight <2200 grams were the participants. In this group, babies were placed in warmers after dressing with a nappy and kept warm in NICU. Mothers were allowed to touch the babies and to feed them. Stable babies were wrapped in baby blankets, kept warm next to their mothers. In both the groups, mothers were counselled regarding the importance and benefits of breast feeding. Mothers were trained regarding manual expression of milk. Infants with weak suck were fed expressed breast milk (EBM) by spoon or through paladay. In both the groups, feeding, axillary temperatures of babies, weight gain, length, head circumference and bonding and confidence of mothers were studied.

1. clinical thermometer was used to measure the axillary temperature while in the hospital
2. Weight was recorded on an electronic weighing scale for infants with an accuracy of +20 g.
3. Length was measured to nearest 0.1cm on an infantometer.
4. Head circumference was measured with a tape. It was measured at birth, discharge, during every visit of follow up till baby reached 2.5 kg.
5. Vitals were monitored as needed.
6. RBS was done once a day using glucometer.
7. Adequacy of breast feeding was assessed.

In both the groups, babies were given calcium, vitamin, zinc and iron supplementation.

Babies were discharged once they met discharge criteria.

1. Weight gain of 15-20 gm/kg /day for three consecutive days.
2. Successful breast feeding or EBM feeding by wati and spoon.
3. Maintenance of temperature with KMC/CMC.
4. No evidence of illness.
5. Mother confident of caring for her baby.

Assessment of bonding and confidence- Mothers were given a questionnaire with 4 questions each having 5 options. Bonding and confidence was assessed on two different days on day 2, and the responses compared between both the groups using lickert's scale.

Follow Up: after discharge, babies were followed up twice a week for the first week, and weekly till babies reached 2.5 kg. Weight, length, head circumference, were measured at every visit. Daily sponging was advised till baby reached 2.5kg. For KMC babies, adaptation at home was assessed by providing another questionnaire.

Statisticall Analysis: The statistical analysis of temperature regulation was assessed by test of proportion. The growth was analysed by student's unpaired test. Breast feeding performance was analysed

by Mann Whitney test. Bonding and confidence was assessed by Wilcoxin Sigmond Rank test. Assessment of KMC adaptation at home was analysed by chi square test. The results were considered significant if p value <0.05.

Results

A total of 30 cases were enrolled in both the groups.

Table-1: Sociodemographic parameters of parents.

Age	KMC Group		CMC Group	
	No	%	No	%
15-29	4	13.33	5	16.66
2-24	24	8.0	24	80.00
>30	0	0	0	0
PARITY				
Primi	14	46.66	21	70
1 – 3	15	50	8	26.66
>3	1	3.33	1	3.33
Education	Wife	Husband	Wife	Husband
Illiterate	0	0	0	0
No graduate	28	23	29	27
Graduate	2	7	1	3
OCCUPATION				
Housewife	29	96.66	29	
Working Mother	1	3.33	1	
Mode of Delivery				
NVD	22	73.33	15	
LSCS	8	26.66	15	

From the above table, it is seen that the age distribution was similar in both the groups. Majority of mothers were in the age group of 20- 24 years. Most of the mothers were in parity status <3. However, there was a statistically significant difference in the incidence of primiparous mothers in KMC group having 46.66% as compared to CMC group having 70.00, p=0.03. Majority of mothers in both the groups were non graduates (KMC group 93.33% versus CMC Group 96.66%, p=0.2276, which is not significant statistically). Majority of mothers in both the groups were housewives. The SES of parents of both groups was almost similar with most of them belonging to low SES of class V, according tomodified kuppuswamy classification. The vaginal route of delivery was more common in KMC group than in CMC group (P<0.05).

Table-2: Characteristics of newborn

SEX	KMC Group		CMC Group	
	No	%	No	%
Male	15	50	13	43.33
Female	15	0	17	56.66
Birth Weight				
<1.5 kg	4	13.33	2	6.66
1.5 – 1.8 kg	10	33.33	13	43.33
1.8 – 2.2 kg	16	53.33	15	50
Gestational Age				
S<32 weeks	2	6.66	0	0
32 – 36 weeks	11	36.66	16	53.33
>37 weeks	17	56.66	14	46.66

From above table, sex distribution was almost similar in both KMC and CMC groups. The birth weight distribution of babies was similar in both groups, majority were in between 1.8-2.2 kgs. Babies with gestational age 33-36 weeks were more in CMC group compared to KMC group. (P=0.09). Babies with gestational age >37 weeks were more in the KMC group compared to CMC group (p=0.219), however these differences were not statistically significant.

Table-3: Temperature regulation in both groups.

Temperature	Pre KMC		Post KMC		Pre CMC		Post CMC	
	No	%	No	%	No	%	No	%
<36	7	23.33	0	0	5	16.66	0	0
36-36.5	17	56.66	0	0	17	56.66	1	3.35
36.5-37.5	6	20.3	30	100	8	26.66	26	86.67
s>37.5	0	0	0	0	0	0	3	9.99

From above table, axillary temperature of babies in both the groups were comparable prior to intervention, whereas statistically significant difference was observed after 4 hours of initiation of kangaroo care and conventional care. 100% of KMC babies maintained temperature in normal range (36.5-37.5). When compared to 86.67% on CMC group. (P=0.092). It was observed that 9.99% had hyperthermia and 3.33% had cold stress in the CMC group.

Table-4: Comparison of growth in both groups at birth, discharge, at 2.5 kg

Parameters	KMC at birth		CMC at birth		P	KMC at discharge		CMC at Discharge		P	KMC at 2.5 kg		CMC at 2.5 kg		P
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Weight	1.51	0.22	1.84	0.28	.66	1.86	.25	1.67	.25	.06					
Length	44.47	3.04	45.2	1.7	.25	45.59	2.8	46.4	1.7	.15	48.83	1.05	48.3	1.4	.18
Head circumference	30.97	1.38	30.5	2.3	.42	31.74	1.1	31.9	1.17	.42	34.4	.54	33.2	1.05	.0001

From the above table, growth parameters were comparable in both groups at birth. KMC babies had a weight gain of +15.731.8696gm/kg/day as compared to 11.631+54gm/kg/day in CMC group. (p <0.0001), which is significant statistically. At discharge, weight of babies in KMC group was higher than in CMC group but this difference was not statistically significant. At 2.5kg, length was similar in both groups, but head circumference was higher in KMC group as compared to CMC group, which was statistically significant, (P<0.0001).

KMC babies required 4.571.4+ weeks to reach 2.5kg when compared to CMC group who required 5.191.8+6 weeks (p=0.1537) which was not statistically significant. Day of initiation of breast feeds was earlier in mothers of KMC group (2.33) as compared to mothers of CMC group (3.83) (p=0.02, significant statistically) Number of breast feeds per day in KMC group (11.250+98) was higher as compared to CMC group (101+25).

This was statistically significant with p=0.0006. The duration of care given to babies in both the groups was comparable. There was no difference in vitals in both groups. KMC group babies had higher blood glucose levels (77.097+9) than CMC group (83.537.4+6), which was significant (P=0.019). The incidence of infection was similar in both groups (9.99%), one case of RDS in both groups, one case of diaper rash in CMC group.

Among 30 mothers of KMC group, 25 mothers liked KMC. Among 5 mothers who did not like KMC, all of them continued to practice KMC because all of them felt their baby was comfortable during KMC. Among 25 mothers who liked KMC, 5 mothers expressed anxiety that baby may fall, 11 mothers felt shy for social reasons, 14 mothers experienced backache and 11 mothers felt it cumbersome to do routine work. Of the 5 mothers who did not like KMC, 3 were anxious baby may fall; all 5 were shy, all experienced backache, felt cumbersome to do routine work.

Discussion

Low birth weight/ preterm babies are associated with high neonatal /infant mortality and morbidity [1]. Of the estimated 4 million neonatal deaths, LBW/preterm infants account for more than 20%. KMC is an effective way to meet baby's need for warmth, growth, well being, breast feeding, and protection from infection, stimulation, safety and love [7].

Through this randomised control trial, the effect of KMC on temperature regulation, promotion of growth, exclusive breast feeding, bonding and confidence of mothers caring for low birth weight babies was studied in total of 60 babies- 30 in KMC group and 30 in CMC group. In the present study, it was observed that the sociodemographic distribution of both the groups were similar, with majority of mothers in both the groups being in the age groupof 20-24 years. The maternal educational status in both the groups was comparable.

Most of them were nongraduates in both the groups. Most of the mothers were housewives in both the groups. Most of the parents were from a lower socioeconomic status of class V according to modified kuppuswamy classification.

In this study, KMC babies had better weight gain at discharge compared to CMC group, but this was not statistically significant. However, the mean weight gain per day in KMC group was better than CMC group which was statistically significant with a p value<0.0001. Similar weight gain per day was seen with other studies [8,9,10].

At weight 2.5 kgs, at end of follow up, there was a statistically significant change in head circumference in KMC group as compared to CMC group. (pvalue <0.0001). Similar increase in head size was seen with Rao et al [10], Charpak et al [11]. There was no significant change in length between both the groups which was in opposition to Rao et al [10].

Temperature regulation: before implementation of care, 23.33% of babies in KMC group, 16.66% of babies in CMC group had hypothermia (<36 degree), 56.66% of both groups cold stress (36.5-37.5), rest had normal temperature. 4 hours after implementation of care, 100% of babies in KMC group maintained normal range of temperature, compared to 86.67% of babies in CMC group. In CMC group, 3.33% had cold stress, and 9.99% had hyperthermia. This was in accordance with kadam et al [12], O.E.Ibe et al [13] where hypothermia was more with CMC group. Similarly, no cases of hyperthermia were seen with Rao et al [10].

Breast feeding: day of initiation of breast feeding was earlier in KMC group as compared to CMC group. (p=0.02, statistically significant). This was in coherence with Bergman NJ et al [14]. all mothers in both the groups had achieved the skill of breast feeding, like attachment of baby to breast, and manual expression of breast milk. The number of feeds/day was higher in KMC group compared to CMC group (11.25+98 versus 10.001.2+5, p=0.0006). This is in agreement with Ramanathan et al [8], Schmidt et al [15]. 93.33% of mothers in KMC group practised exclusive breast feeding as compared to 86.6% mothers in CMC group, (p>0.05, not statistically significant).

This was unlike with Cantanneo et al [16]. A longer follow up up to 6 months would be necessary to know the beneficial effect of KMC on exclusive breast feeding as it is well known that prolonged skin to skin contact promotes exclusive breast feeding.

Duration of hospital stay: in the present study, duration of hospital stay was similar in both the groups. This was similar with Rao et al. In contrast, few studies showed earlier discharge were observed with KMC group as in Ramanathan et al [8], Cattaneo et al [16], Charpak et al [11]. In our study, discharge criteria for low birth weight babies was weight gain for 3 consecutive days, irrespective of actual weight or gestation of the baby. If we had fixed target weight criteria for discharge, it is likely that the KMC group would have shorter hospital stay considering their higher daily weight gain.

In this study, there was a case each of respiratory distress in both groups, there were no cases of tachycardia, bradycardia or apnea in both the groups. Babies of KMC group had higher blood glucose levels compared to CMC group, similar to Christenson et al [17]. No significant difference was noted in incidence of infection in both the groups. This is in accordance with Kadam et al [12], Charpak et al [11]. This was in contrast with Rao et al where incidences of infections were less in KMC group. These differences could be due to sample size variation.

Bonding and confidence of mothers: bonding and confidence of mothers was evaluated by using a

questionnaire incorporating the lickertsscale. KMC mothers showed statistically significant high level of satisfaction, comfort and increase in confidence in handling their babies. Analysis of questionnaire on day 7 after starting KMC shows that there was an enhancement of bonding and confidence level on day 7 compared to day 2.

The enhancement was higher in KMC group with the P value of less than 0.0001 when compared to CMC group. These were in coherence with Ramanathan et al [8] and Tessier et al [18].

In our study, 14 mothers experienced backaches during KMC, 11 mothers were shy for social reasons, 3 mothers were anxious that baby may fall. These apprehensions could be alleviated with frequent counselling and reassurance to the mother during their hosipital stay and on follow-up. Community awareness of the benefits of KMC in the management of low birth weight babies is essential, so that KMC can be accepted and adopted as the mode of care for low birth weight babies in the society.

Conclusion

We conclude that

1. Temperature regulation was more stable in KMC group unlike in CMC group, with three cases of hyperthermia and one case of cold stress.

2. Mean weight gain per day was higher in KMC group; mean head circumference at 2.5 kgs weight was higher in KMC group as compared to CMC group.

3. Initiation of breast feeds, number of breast feeds was higher with KMC group.

4. Confidence level of mothers, bonding was higher in KMC group as compared to CMC group.

Hence KMC is at cost effective, safe, most acceptable humane method of caring for low birth weight babies.

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