

**Research Article**

**Kangaroo Mother Care technology as a boon to tertiary care hospital in western Maharashtra**

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**Abstract**

**Background:** Hospital neonatal intensive care of LBW babies is difficult in developing countries and infants become a burden for health and social systems. In kangaroo mother care, the mother acts as an incubator and the main source of food and stimulation for LBW infants. Government Medical College, Kolhapur in Maharashtra caters largest part of health care to the population of western Maharashtra.

**Objectives:** To study the effects of kangaroo mother care on growth pattern of low birth weight babies and on risk factors for illness in LBW.

**Methods and Material:** This retrospective cohort study was performed on medical record of 120 neonates in one year duration at tertiary care hospital. Babies who received Kangaroo Mother Care were grouped as KMC group and the babies who were in neonatal intensive care with conventional management grouped as CMC. Primary outcome variable was growth pattern which was measured by weight gain, length gain and increase in head circumference. Secondary measures included risk of hypothermia, sepsis, apnea, hypoglycemia and duration of hospitalization. The data was analysed by using Epi info 3.5.1 software package. The p values less than 0.05 were taken as statistically significant.

**Results:** The daily weight gain in LBW babies in KMC ( $25.28\text{gm} \pm 7.38$ ) was found more than CMC i.e.  $14.21\text{gm} \pm 4.4$ . The increment in length of babies in KMC was  $0.99\text{cm/week} \pm 0.19$  found more as compared to CMC ( $0.70\text{cm/week} \pm 0.19$ ). There was 5% incidence of hypothermia in KMC that had far less than CMC (33.33%). The present study showed lesser duration of hospital stay. The exclusive breast feeding rate at one month of follow up was 95% in KMC and 78.34% in CMC.

**Conclusions:** Kangaroo mother care accelerates growth pattern and reduces the risk against hypothermia, severe sepsis and apnea. It is superior alternative to neonatal intensive care of LBW babies in institute with limited resources.

**Keywords:** Kangaroo, Conventional, Low birth weight.

**Key Messages:** Kangaroo technique is best for low birth babies.

**1. Introduction**

Kangaroo Mother Care (KMC) is defined as early, prolonged and continuous skin-to-skin contact between the mother and the low birth weight infant both in hospital and after discharge, with exclusive breastfeeding and proper follow up.<sup>1</sup> The mother is used as incubators and as the main source of food and stimulation for LBW infants while they mature enough to face extra uterine life in similar condition as that born at term.<sup>2</sup>

Nearly one third of Indian neonates are LBW, weighing less than 2500gm at term. Overall 70 percent of perinatal death, 85 percent of neonatal death and 50 percent of infant death occur among LBW babies.<sup>3</sup> Thus the care of such infants becomes a burden for health and social systems. Amongst the causes of morbidity and mortality in these babies, the most dangerous are hypothermia, hypoglycemia and sepsis. Hence the LBW infants require the utmost care at hospital setup and at home after stabilization.

Traditionally these infants born in hospital are kept in incubators/ radiant warmers/ warm room with open cots. Hospital neonatal intensive care of LBW babies is difficult in developing countries due to high cost, difficulty in maintenance and repairs of equipment's, intermittent power supply, inadequate cleaning of instruments and shortage of skilled staff.<sup>4</sup>

Despite of said advantages of KMC it is still not a widely practiced method of care of LBW infants in institutes with limited resources also KMC is newer technique; considering this factors we have conducted a present study to assess the benefits in our institute. The present study was undertaken to study the effects of KMC on growth pattern of low birth weight babies and on risk factors for illness at Government Medical College, Kolhapur which caters largest part of health care to the population of western Maharashtra.

## 2. Material and Methods

This retrospective cohort study was performed on medical record of 120 neonates delivered by vaginal route/caesarean with birth weight below 2000gm in a neonatal intensive care unit (NICU) of Government Medical College at Kolhapur, Maharashtra during Nov 2011 to Sep 2012.

Critically ill babies requiring ventilator support or inotropic support, babies with chromosomal and life threatening congenital anomalies or whose mother were critically ill, or unable to comply with the follow up schedule were excluded. Primary outcome variable was growth pattern and measured by weight gain, length gain and increase in head circumference. Secondary measures included risk of hypothermia, sepsis, apnea, hypoglycemia and duration of hospitalization.

The subjects were divided into two groups: study group- Kangaroo Mother Care (KMC) and control group- Conventional Method Care (CMC). The two groups had received similar care except the KMC intervention.

Mothers in KMC group had received education regarding KMC, provided skin to skin contact using specially tailored "Kangaroo bag" made of soft flannel cloth. The mothers were encouraged to keep the baby in KMC as long as possible during the day and night with a minimum period of one to two hours at a time. The mothers were given a "KMC chart" to keep a record of the duration of kangaroo care provided. The babies of CMC group had in NICU under either servo controlled radiant warmers or in a cradle under hot lamps.

From the medical record babies information regarding weight on an electronic weighing scale (Conweigh electronic weighing scale accuracy of  $\pm 5$  g) immediately after birth and subsequently daily one hour after feeds till discharge was noted. The measured length at birth, on discharge and on each follow-up visit by using an infantometer recorded. Head circumference (HC), chest circumference (CC), mid-arm circumference (MAC) and foot length were recorded at birth, on discharge and on each follow-up visit. Nutritional status of babies regarding exclusively breastfed, calcium (100 mg/kg/d), phosphorus (50 mg/kg/d), multivitamin supplements, and expressed breast milk by orogastric tube or using a bondla or sterile wati and spoon were recorded.

The information of babies in both the groups for hypothermia, hypoglycemia, apnea, sepsis, feeding problem and other morbidities noted. Babies' status of weight gain of 10-15 g/kg/d for three consecutive days and maintenance temperature without assistance were recorded.

### 2.1 Statistical Methods

The data was analysed by using Epi info 3.5.1 software package. The p values less than 0.05 were taken as statistically significant.

## 3. Results

Out of 60 neonates from KMC Group 34(56.67%) were male and 26(43.33%) female. Whereas in CMC Group, 31(51.67%) were male and 29(48.33%) female. Both groups were comparable in terms of sex distribution at the time of enrolment with p value 0.55.

The birth weight in KMC was  $1677.16 \pm 201.26$ gms and in CMC  $1699 \pm 199.34$ gms. Weight at enrolment in KMC was  $1610.16 \pm 199.83$ gm and in CMC ( $1627.33 \pm 204.33$ gm). There were total 65 preterm and 15 term LBW babies. In KMC 40(66.67%) neonates were preterm small for gestational age (SGA) and in CMC 42(70.00%). The length in KMC was  $44.23 \pm 2.85$ cm and  $44.19 \pm 2.19$  in CMC. Also head circumference was ( $29.60 \pm 1.68$ cm) in KMC and ( $29.73 \pm 1.86$ cm) in CMC. At enrolment both groups were comparable in terms of weight, gestational age, length and head circumference with p value  $>0.05$ .

**Table No. 1. Distribution of LBW Babies at the time of enrolment**

Characteristics	KMC(n=60)	CMC(n=60)	P value
Male	34(56.67%)	31(51.67%)	0.58
Weight in gm (mean± SD)	$1610.16 \pm 199.83$	$1627.33 \pm 204$	0.64
Age in days (mean)	3 days	4 days	0.27
Total length in cm (mean± SD)	$44.14 \pm 2.19$	$44.23 \pm 2.35$	0.82
Head circumference in cm (mean± SD)	$29.60 \pm 1.68$	$29.72 \pm 1.86$	0.71

Babies who received kangaroo care had lesser duration of hospital stay compared to conventional care i.e.  $12.38 \pm 4.96$  days vs  $17.45 \pm 8.16$ days. The daily weight gain in babies receiving kangaroo care is more than those babies who receive conventional care. KMC babies were having daily increment of  $25.28 \pm 7.38$ gm compared to  $14.21 \pm 4.41$ gm in CMC.

The average increment in length per week in KMC group was more than CMC group ( $0.99 \pm 0.19$  vs. CMC  $0.70 \pm 0.19$  cm). The babies receiving kangaroo care had better increment in head circumference than those receiving conventional care ( $0.75 \pm 0.23$  vs.  $0.49 \pm 0.15$  cm). The effects of kangaroo care on hospital stay and anthropometry were beneficial to LBW babies as p value  $<0.05$ .

Only 3(5.0%) kangaroo care babies were suffered from hypothermia compared to 20(33.33%) CMC. Similarly, 02(03.33%) kangaroo care babies had and 14(23.33%) with conventional care. Whereas 03(05.00%) KMC babies had apneic attack and 18 (30.00%) in CMC. On follow up at 1 month more babies from KMC group were exclusively breast feed (95% vs. 78.34%). The effects of kangaroo care on hypothermia, sepsis, apneic attack and exclusively breast feeding were protective as p value  $<0.05$ .

**Table No. 2. The effect of KMC and CMC on low birth weight babies at tertiary hospital.**

Study variables	KMC(n=60)	CMC(n=60)	p value
Daily weight gain in grams (Mean± S.D.)	$25.28 \pm 7.38$	$14.21 \pm 4.41$	$<0.001^*$
Increment of length in cm /week (Mean ± S.D.)	$0.99 \pm 0.19$	$0.70 \pm 0.19$	$<0.001^*$
Increase in head circumference in cm /week (Mean ± S.D.)	$0.75 \pm 0.23$	$0.49 \pm 0.15$	$<0.001^*$
Incidence of hypothermia	03(5.0%)	20(33.33%)	$<0.001^*$
Incidence of sepsis	02(03.33%)	14(23.33%)	$0.001^*$
Incidence of apnea	03(05.00%)	18(30.00%)	$<0.001^*$
Exclusive breast	58(96.66%)	47(78.33)	$0.002^*$
Hospital duration in days (Mean ± S.D.)	$12.38 \pm 4.96$	$17.41 \pm 8.16$	$<0.001^*$

\* Statistically significant, p= significance value.

#### 4. Discussion

The study showed significantly higher mean weight gain per day of KMC group infants during hospital stay compared to the control infants. This is in accordance with observation made by Cuttaneo *et al* (21.3gm vs 18.61gm), Rao *et al* (23.9gm vs. 15.58gm), and Gathwala *et al* (21.92 vs. 18.61gm).<sup>1,5,6</sup> Better weight gain might be due to reduced energy expenditure, thus reserving energy and calories toward physical growth.

We found that babies with KMC had better length increment (0.95 vs. 0.70 cm). This outcome was similar to study by Rao *et al*<sup>5</sup> The increase in physical growth more rapidly may be due to exclusive breast feeding, temperature maintenance, physiologic stability and decreasing morbidities. In present study babies who had received KMC had better increment in weekly head circumference (0.99cm vs. 0.70cm). This finding was similar to observations made by Rao *et al* (0.75cm vs. 0.49cm) and Gathwala *et al* (0.59cm vs. 0.47 cm).<sup>5,6</sup>

The present study had also shown that babies receiving KMC is discharged earlier (12.38 day's vs. 17.41days). This finding was similar to conclusion made by Cattaneo *et al* (13.4days vs16.3 days).<sup>1</sup> In present study neonates were discharged when they achieved weight gain of 10-15gm/kg/day for 3 consecutive days. The finding in present study does not match with the conclusion made by Rao *et al* and Kadam *et al*.<sup>5, 7</sup> This difference may be due to individual hospital discharge strategy.

In present study mean duration of KMC provided was 11.45 hours which is comparable with Rao *et al* as 13.5 hours and Kadam *et al* as 9.8 hours. The shorter duration of skin to skin contact could be due to the promotion of mother alone as the kangaroo care provider due to the institutional policies preventing father and the relatives to be with the baby in the NICU or postnatal ward.

In present study the babies receiving KMC had reduced incidence of hypothermia (3/60 vs. 20/60). This finding was similar to Kadam *et al* (10/44 vs. 21/45), Rao *et al* (6/103 vs. 38/103) and Ali *et al* (1/58 vs. 10/58). Also, we found little incidence of sepsis similar to the finding of Rao *et al* (4/103 vs. 15/103) and Ali *et al* (4/58 vs. 13/58). This might be due to early hospital discharge resulting in decreased chances of hospital acquired infection.

In present study the episodes of apnea in <32 weeks babies in KMC group was significantly less than CMC group. This finding is similar to the finding of Rao *et al* (4.3% vs. 44.4%) and Ali *et al* (1.7% vs. 14.3%). Present study recorded a higher proportion of exclusive breastfeeding among KMC infants (95% vs78.34%). These was in accordance with Rao *et al* (98%vs76%) and Ramnathan *et al* (86%vs43%).<sup>8</sup>

## 5. Conclusion

Kangaroo mother care accelerates growth pattern in LBW babies and reduces hospital stay. By promoting kangaroo mother care, exclusive breast feeding was ensured in LBW babies. Kangaroo mother care had a protective effect on morbidities like hypothermia, sepsis and apnea. It is superior alternative to conventional method of care in institutions with limited resources as our hospital at Government Medical College, Kolhapur in Maharashtra.

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