



## A STUDY ON THE ROLE OF KANGAROO MOTHER CARE ON THE VITAL SIGNS IN PRETERM AND LOW BIRTH WEIGHT NEONATES

<b>Dr. Suguna Chejeti</b>	DM Resident, Department of Neonatology, Niloufer Hospital, Osmania Medical College, Hyderabad
<b>Dr. Hima Bindu Singh*</b>	Professor and HOD of Neonatology, Department of Neonatology, Niloufer Hospital, Osmania Medical College, Hyderabad *Corresponding Author
<b>Dr. Neetika Ashwani</b>	Medical Officer, Special newborn care unit (SNCU), Niloufer Hospital, Osmania Medical College, Hyderabad
<b>Dr. Namala Bharadwaj</b>	DM Resident, Department of Neonatology, Niloufer Hospital, Osmania Medical College, Hyderabad
<b>Dr. Usha Rani Hasthi</b>	DM Resident, Department of Neonatology, Niloufer Hospital, Osmania Medical College, Hyderabad

### ABSTRACT

**Aims & Objectives:** To know whether minimum of one hour KMC can bring about significant changes vital parameters like temperature, respiratory rate, heart rate and oxygen saturation in preterm and low birth weight neonates.

**Methods & Methodology:** The study was conducted in Niloufer Hospital. All neonates admitted with preterm of gestational age between 28 – 37 weeks and low birth weight of less than 2500 grams. Sample selected for present study was 300 postnatal mothers with their preterm and LBW neonates. The Statistical software namely SPSS 17.0, was used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

**Results:** The average weight gain during KMC stay was 21.94 g/kg/day in term, 20.58 g/kg/day in late preterm and 18.76 g/kg/day in early preterm. The average day when neonates started gaining weight irrespective of groups was 8.5 days and average weight gain irrespective of groups is 19.9 g/kg/day. The average duration of KMC stay in term was 3.5 days, in late preterm was 5.5 days and early preterm was 6 days. Average duration of hospital stay being 9 days for term, 12 days for late preterm and 13.9 days for early preterm. The morbidity of neonates enrolled in our study requiring NICU admissions apart from LBW were hyperbilirubinemia comprising majority of 51.9%, sepsis 19.4 %, respiratory illness 7.8%, hypothermia comprising 6.4 %, metabolic cause, central nervous system illness, abdominal illness forming the rest.

**Conclusion:** KMC is an effective intervention, which can be safely included in the management of LBW neonates in kangaroo care ward and in NICU. KMC can be implemented as alternative method where NICU is over burdened with LBW neonates admission. Education on KMC and its benefits should be organised for nurses and primary health care workers. Education and demonstration must be provided to each mother of LBW and they should be encourage to practice KMC.

**KEYWORDS :** kangaroo mother care, weight gain, tertiary care centre

### 1. INTRODUCTION

Nearly 20 million neonates are born each year, because of either preterm birth or impaired prenatal growth, mostly in less developed countries.<sup>1</sup> The important birth outcomes related to LBW include both neonatal death and post neonatal death, short-term morbidities such as hypothermia, hypoglycaemia, respiratory distress syndrome, infections and necrotizing enterocolitis, and long-term morbidities such as blindness, deafness, hydrocephaly, mental retardation, and cerebral palsy.<sup>2</sup> LBW and preterm birth are thus associated with high neonatal and infant mortality and morbidity. Of the estimated 4 million neonatal deaths, preterm and LBW babies represent more than a fifth. Therefore, the care of such infants becomes a burden for health and social systems everywhere.<sup>1</sup>

KMC method was developed in the 1970's in Colombia by neonatologists Edgar Rey Samaria and Hector Martinez Gomez, in response to overcrowded neonatal care units. This method includes three main components: 1) skin-to-skin contact—a newborn baby is kept in a prone position between the mother's breasts several hours a day provide tactile, kinaesthetic and vestibular stimulation and to transmit heat from the parent's to infant's body; 2) exclusive on-demand breastfeeding; and 3) early hospital discharge with appropriate follow-up.<sup>3</sup> It is a gentle effective method that avoids the agitation routinely experienced in a busy ward with LBW / preterm infants. In addition, the baby is colonized by the mother's commensal organisms reducing the risk of nosocomial infections especially in a hospital environment. KMC can be started after birth as soon as the baby is clinically stable, and can be continued at home

until the baby is stronger and begins to wriggle out which is often around the time the baby would have been born if they had been full term.<sup>4</sup> The most recent definitions of KMC: 'a standardized, protocol-based care system for preterm and/or LBW infant, based on skin-to-skin contact between the preterm baby and the mother. It is a conceptually simple, elegant technique in which the role of kangaroo healthcare providers is basically to teach, coach, offer expert counselling, and closely monitor the mother infant dyad. It is not "alternative" medicine but a scientifically sound, multilevel intervention.<sup>5</sup> However; kangaroo mother care is an effective way to meet baby's needs for warmth, breastfeeding, protection from infection, stimulation, safety and love.<sup>1</sup>

Hence this study is undertaken to observe which particular subgroup of preterm babies would be benefited more with Kangaroo mother care and evaluate the possible changes in peripheral oxygen saturation, temperature, heart rate and breathing rate following the application of Kangaroo Mother Care in premature and low birth weight neonates in tertiary care hospital. We are taking one hour observation as end point because hemodynamic stability can be achieved in one hour. The need for adequate training for the professionals involved is emphasized, as is the need for the mothers to be well informed regarding the benefits brought through kangaroo mother care.

The present study was proposed to know the effect of minimum one hour of KMC can bring about significant changes vital parameters like temperature, respiratory rate, heart rate and oxygen saturation in preterm and low birth weight neonates.

**2. METHODOLOGY**

The present study was conducted among the Preterm and low birth weight neonates admitted to the Department of Neonatology, Niloufer Hospital, Hyderabad during the period of May 2016 to April 2017.

**Study design**

Hospital based prospective observational study.

**Source of data**

All neonates born or admitted with preterm and low birth weight of < 2500 grams in the Department of Neonatology, Niloufer Hospital, Hyderabad.

**Sample size:** Consecutive sample of 300 eligible babies in a period of 12 months i.e., from 1<sup>st</sup> May 2016 to 30<sup>th</sup> April 2017, were studied.

**Inclusion criteria**

- Preterm neonates of gestational age between 28-37 weeks as per extended Ballard scoring system, admitted in to the NICU or KMCU, and who are clinically stable are the subjects.
- Neonates having birth weight less than 2500 grams.
- Preterm neonates from our hospital deliveries and brought from outside are included.
- Newborns of mothers who were willing to participate in the study.

**Exclusion Criteria**

- Neonates with five minute APGAR < 3 at 1 min.
- Neonates who are hemodynamically unstable.
- Neonates with any major congenital anomalies like cleft palate, which interferes with breast feeding.
- Neonates on IV fluids.
- Critically ill mothers who are unable to remain with their babies because of their medical problems.

After Institutional Ethics Committee approval, and with consent of mother fulfilling inclusion criteria, they were enrolled in the study. Newborn vital parameters, Heart rate and SpO2 were recorded by pulse oximeter. Rectal temperature in °C by rectal thermometer and respiratory rate by counting for one minute. Birth weight and Gestational age of baby.( based on modified New Ballard's score/ antenatal Ultrasonography/ LMP whichever is reliable) Babies were classified into AGA or SGA based on birth weight – gestational age curves of Cloherty. Then temperature, pulse, peripheral oxygen saturation and respiration rate of the neonate was measured at regular set intervals, i.e. just before KMC, 1 hour after initiating KMC and thereafter monitored at regular interval for 7 days. We followed the case till discharge

**Data analysis: Statistical Methods:** Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data are made.

Descriptive statistics was used to analyse non parametric tests. Chi square tests was used to asses significant difference between 2 groups and p<0.05 was considered significant.

Student't' test was used to compare 2 groups of continuous data. P<0.05 was considered significant and p<0.01 was considered highly significant.

**Statistical software:** The Statistical software namely SPSS 17.0, was used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

**3. RESULTS**

The age distribution of mothers majority were being in the age

group of 20 to 25 years consists 54% of mothers. The parity status of the mothers showing almost equal number of primi para (48.66%) and multi para (51.33%). In the present study it was observed that majority of parents were non graduates 208 (69.33%) in females and 221 (73.66%) in males, However this was not statistically significant. It was observed that the incidence of graduates was low in both the groups. Occupational status of the mothers, majority of mothers (84.33%) were housewives. Inborn neonates (63.3%) were more than outborn (32.7%). Among inborn majority were from labour ward followed by Operation Theater. Among outborn majority were referred from various hospitals and 4 were home delivery. Sex distribution of the newborn, shows female babies were more than males (52.3% Vs 47.7%).

**TABLE 1: Birth weight distribution of the newborn**

Group	AGA (%)	SGA (%)	Total (%)
Term	1	11	12 (4.0)
Late Preterm	32	140	172 (57.3)
Early preterm	104	12	116 (38.7)
Total	137 (45.6)	163 (54.4)	300 (100)

Table 1 shows in decreasing order of frequency neonates studied were late preterm, early preterm and term. SGA were more than AGA. Among SGA late preterm were majority and AGA early preterm were majority.

**Table No. 2: Vitals of neonates before and after KMC.**

Vitals		MEAN	STANDARD DEVIATION
Temperature	Before KMC	36.43	0.21
	After KMC	36.84	0.24
Respiratory Rate	Before KMC	35.03	15.96
	After KMC	40.19	14.57
Heart Rate	Before KMC	139.64	28.08
	After KMC	126.55	27.72
Saturation	Before KMC	98.11	1.21
	After KMC	99.18	0.55

Table 2 evaluating vitals showed after KMC, newborns temperature raised by 0.41 °C, respiratory rate increased by 5/min, heart rate decreased by 13/min, saturation increased by 1%.

**Table No. 3: Average weight gain in different groups during hospital KMC stay.**

Group	MEAN	STANDERD DEVIATION	MINIMUM	MAXIMUM
Term	21.94	8.61	10.00	40.00
Late Preterm	20.58	12.09	-17.50	92.50
Early preterm	18.76	10.33	-20.00	70.00
Total	19.93	11.33	-20.00	92.50

Table 3 shows average weight gain during KMC stay was 21.94 g/kg/day in term, 20.58 g/kg/day in late preterm and 18.76 g/kg/day in early preterm. The average day when neonates started gaining weight irrespective of groups was 8.5 days and average weight gain irrespective of groups is 19.9 g/kg/day.

**Table No. 4: Average duration of hospital stay in neonates.**

Group		Mean	Standerd Deviation	Minimum	Maximum
NICU stay	Term	5.50	1.83	3.00	9.00
	Late preterm	6.61	3.86	2.00	22.00
	Early preterm	7.91	4.71	2.00	25.00
Hospital KMC stay	Term	3.58	0.99	3.00	6.00
	Late preterm	5.50	3.96	3.00	34.00
	Early preterm	6.03	3.86	3.00	28.00
Hospital stay	Term	9.08	2.10	6.00	12.00
	Late preterm	12.11	5.86	5.00	42.00
	Early preterm	13.95	6.95	6.00	38.00

Above table 4 shows that average duration of KMC stay in term was 3.5 days, in late preterm was 5.5 days and early preterm was 6 days. Average duration of hospital stay being 9 days for term, 12 days for late preterm and 13.9 days for early preterm.

## DISCUSSION

Our study group of 300 neonates contained females more than males, inborn more than outborn, SGA more than AGA, late PT more than early PT and term neonates.

In our study neonates body temperature significantly increased while they are placed in KMC in this study. This is in accordance to study performed by Dandekar RH et al,<sup>6</sup> Ghavane et al,<sup>7</sup> Gathwala G. et al<sup>8</sup> and many others. Baby is in contact with warm maternal skin and receives heat from mother's breast on each side and from her chest in front and rise in skin temperature is as a result of conductance of heat from mother to the infant. Placement of the infant underneath a blouse improved insulation and prevents heat loss during the maternal kangaroo care. Higher temperature in the skin-to-skin contact in the present and the earlier studies provide evidence that maternal body is an efficient heat source for the baby. Thermal control is very important for LBW neonates because of their great tendency towards hypothermia, and it thus contributes towards homeostasis.

A significant increase in respiratory rate, decrease in heart rate and increase in oxygen saturation was seen in neonates receiving KMC in our study. In Acholet et al<sup>9</sup> and Kadam et al<sup>10</sup> found higher oxygen saturation and reduction in respiratory rates after KMC. Ventilation and perfusion are gravity dependent, so an upright position optimizes respiratory function. Also since the newborn was calm and comfortable in contact with its mother, which probably decreased the consumption of oxygen and increase in saturation. Decreases in heart rate may be associated with lower stress; calmer experiences in relation to the hospital routine, calm sleep, or even bradycardia. In our study though respiratory rate increased in contrast to Acholet et al<sup>9</sup> and Kadam et al<sup>10</sup> it was towards normal. Further research should investigate the initiation of KMC in the hospital before stabilization of vitals, which was not feasible in this study.

Present study recorded a higher proportion of neonates achieved transition from predominant expressed breast milk consumption to predominant direct breastfeeding during hospital kangaroo mother care. This was in accordance with Rao et al (98%)<sup>11</sup> and Ramnathan et al (86%).<sup>12</sup> Also all infants were on exclusive breastfeeding at follow up and on were on regular supplements.

The study showed significantly mean weight gain per day during in hospital KMC of 20 gm/day and during follow up. This is in accordance with observation made by Cattaneo et al (21.3gm),<sup>13</sup> K. Ramanathan, et al. (15.9 gm),<sup>12</sup> Rao et al (23.9gm)<sup>11</sup> and Gathwala et al (21.92gm).<sup>8</sup> We found that babies with KMC had better weekly length increment. This outcome was similar to study by Rao et al.<sup>11</sup> The increase in physical growth more rapidly may be due to exclusive breastfeeding, temperature maintenance, physiologic stability and decreasing morbidities. In present study babies who had received KMC had better increment in weekly head circumference. This finding was similar to observations made by Rao et al (0.75cm)<sup>11</sup> and Gathwala et al (0.59cm).<sup>8</sup>

Neonates were discharged early as they met our discharge criteria. The average day at discharge in term neonates was 9 days, late pre term was 12 days and in early pre term was 14 days. This finding was similar to conclusion made by Cattaneo et al (13.4days).<sup>13</sup> Though in, K. Ramanathan, et al.<sup>12</sup> study average day of hospital stay was 27.2±7 days. This difference may be due to individual hospital discharge strategy. Early discharge decreases the overcrowding in the neonatal units thereby reducing the chances of contracting hospital-acquired infection and also reduces the economic burden imposed on the family. Eventually it would also reduce the overall burden on the health services.

We could not confirm when the birth weight was regained as babies were discharged earlier and many did not turn up for initial follow up, but average duration needed when weight gain began after starting KMC was 8.5 days of chronological age in all groups.

One of the strengths of our study is the high follow-up rate among KMC infants, comparable to other studies. The better follow-up rate in the KMC group could be due to the active involvement of the mother in the care of her LBW baby or the strong rapport between the KMC mother and the health personnel. Home visit was not possible in the present study. However, the higher follow-up by KMC mothers suggests that early discharge with regular follow-up of LBW infants is definitely feasible without compromising on the health of the baby. In the present study, maternal acceptance of KMC was good and concurred with other studies. All the mothers were able to practice KMC at home and no adverse events were reported. The response of the family and/or the father was supportive. Few mothers during hospital KMC stay were confident enough to serve as advocates for KMC and they were an important source of support for the newly enrolled mothers. This study has demonstrated that KMC is feasible in the Indian household. However, KMC was initiated in the hospital under close supervision and guidance and only later continued at home. Further research should investigate the implementation of KMC after initiation in the community.

The limitations of our study are it's an observational study, sample being purposive and not a true representative of study population. As our study is confined to our hospital setting, the generalization to community cannot be made.

## CONCLUSION

In this study it was found that KMC promoted an improvement in body temperature, thereby contributing towards improvement of thermal control, decreased heart rate, increased peripheral oxygen saturation, improvement of tissue oxygenation and improved breathing rate, which brought greater respiratory comfort to the newborns. KMC is a cost effective, safe, most acceptable, human method of caring for LBW babies.

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