



## Community based kangaroo mother care for low birth weight babies: A pilot study

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Received April 22, 2015

**Background & objectives:** Kangaroo mother care (KMC - early continuous skin-to-skin contact between mother and infants) has been recommended as an alternative care for low birth weight infants. There is limited evidence in our country on KMC initiated at home. The present study was undertaken to study acceptability of KMC in different community settings.

**Methods:** A community-based pilot study was carried out at three sites in the States of Odisha, Gujarat and Maharashtra covering rural, urban and rural tribal population, respectively. Trained health workers provided IEC (information, education and communication) on KMC during antenatal period along with essential newborn care messages. These messages were reinforced during the postnatal period. Outcome measures were the proportion of women accepting KMC, duration of KMC/day and total number of days continuing KMC. Focus group discussions and in-depth interviews were also carried out.

**Results:** KMC was provided to 101 infants weighing 1500-2000 g; 57.4 per cent were preterm. Overall, 80.2 per cent mothers received health education on KMC during antenatal period, family members (68.3%) also attended KMC sessions along with pregnant women and 55.4 per cent of the women initiated KMC within 72 h of birth. KMC was provided on an average for five hours per day. Qualitative survey data indicated that the method was acceptable to mothers and family members; living in nuclear family, household work, twin pregnancy, hot weather, *etc.*, were cited as reasons for not being able to practice KMC for a longer duration.

**Interpretation & conclusions:** It was feasible to provide KMC using existing infrastructure, and the method was acceptable to most mothers of low birth infants.

**Key words** Acceptability - community - feasibility - kangaroo mother care - low birth weight

Low birth weight (LBW) and prematurity account for 28 per cent of all newborn deaths globally<sup>1</sup>. It is a major contributor to neonatal and infant morbidity with 30 per cent mortality in developing countries. Kangaroo mother care (KMC) was developed (by Dr. Edgar Rey and Dr. Hector Martinez of Bogota, Columbia) as an alternative to standard care for preterm newborn infants<sup>2</sup>. Early continuous skin-to-skin contact with exclusive breastfeeding is the cornerstone of KMC. KMC has been found to result in early recovery from hypothermia, reduced morbidities, early discharge from hospital and weight gain amongst LBW stabilized infants<sup>3</sup>. The published articles and meta-analysis have shown that KMC substantially reduces neonatal mortality amongst preterm infants [birth weight (b.wt.) <2000 g] in hospital and is highly effective in reducing severe morbidity due to infections<sup>4,5</sup>. KMC has been recommended as an alternative care for LBW infants whenever possible<sup>6</sup>. Skin-to-skin contact and promotion of exclusive breastfeeding have been the essential components of newborn care programme of the Government of India. The government has been promoting KMC through Facility Based Integrated Management of Newborn and Childhood Illnesses (F-IMNCI), *Navjaat Shishu Suraksha Karyakram* (NSSK)<sup>7</sup>. Operational guidelines have been released for programme managers and service providers for implementation of KMC at facility<sup>8</sup>. Evidence on community-based KMC is limited in India. In a study carried out in rural Uttar Pradesh, skin-to-skin contact was found to be acceptable when introduced through appropriate cultural paradigm<sup>9</sup>. However, there is a need to test acceptability of the method in different community settings. This pilot study was therefore, carried out to test the feasibility and acceptability of the KMC method in three different settings covering rural, rural tribal and urban population.

### Material & Methods

This study was carried out during 2010 and 2011 at three sites in the States of Odisha, Gujarat and Maharashtra representing rural, urban and rural tribal population, respectively. Population of one primary health centre (PHC) area was covered in Odisha, whereas in tribal area of Maharashtra, two PHCs, and in Gujarat, urban population within two municipality areas and some peri-urban areas were covered. All home deliveries as well as hospital deliveries if mothers returned home within one week of delivery, with infants weighing 1500-2000 g of both sex, irrespective of gestational age whose mother gave consent to

participate were included in the study. Mothers with problems (sick mothers, significant bleeding, features suggestive of chorioamnionitis, psychiatric illness and post-partum convulsions) were excluded from the study.

*Intervention:* This project was initiated by the Indian Council of Medical Research (ICMR) Headquarters at New Delhi, India, and was started after obtaining approval of district health officials and also approval of Institutional Ethics Committees of each selected site. Centralized training for project investigators and project staff was carried out at the AIIMS (All India Institute of Medical Sciences) KMC Network Centre. Resource material developed by AIIMS (adapted version of WHO's training manual<sup>9</sup>) was used in the study. Training on community component of KMC was carried out by staff of Community Empowerment Lab at Lucknow, Uttar Pradesh. Trained project staff along with project investigators provided training to health workers - auxiliary nurse midwives (ANMs), *anganwadi* workers (AWWs), accredited social and health activists (ASHAs) and traditional birth attendants (TBAs). Orientation training for PHC medical officers and child development project officers (CDPO) was also held.

All pregnant women of the study areas were enlisted and provided IEC (information, education and communication) on KMC by ANMs, AWWs and ASHAs. Counselling included messages on essential newborn care (warmth, delay bathing, early initiation and exclusive breastfeeding and clean, hygienic practices for prevention of infection), and KMC which included detailed information on the method, its benefits, KMC position and breastfeeding during KMC. The pregnant women were informed that they would be included in the study after delivery if the newborn weighs 1500-2000 g. Family members were also encouraged to attend IEC sessions. Presentations, posters and flip charts, skill demonstration/practice on manikins and video films were used for counselling. Counselling of pregnant women was also done during village health nutrition day and village level meetings in Odisha. Resource materials as well as study tools were translated into local languages at respective sites.

Written consent was taken post-delivery after recording birth weight for home as well as hospital deliveries. KMC was initiated at home. ANM/AWWs/ASHAs/TBAs helped women to keep newborns in skin-to-skin contact, helped to breastfeed in that position and

advised them further regarding the continuation of the method for 1-2 months (gestational age around 40 wk, or weight 2500 g or till the newborn feels comfortable in that position). The other family members such as husbands and mothers-in-law were also encouraged to keep newborns in skin-to-skin contact. Mothers were told about danger signs (newborns stop feeding, become restless or irritable, have fever, remain cold despite warming, difficulty in breathing, diarrhoea or any other worrying signs) for early detection of morbidity and were advised to seek care.

Field workers who were not involved in counselling followed up all newborns every day during the first week of initiation of KMC, and subsequently on days 9, 11, 13 and last visit on 56/60 days. Information on demographic characteristics, delivery details, time of initiation of KMC and duration, adherence to method, frequency of breastfeeding, morbidity in newborn or any discomfort experienced by the mother, reasons for non-compliance, *etc.*, was collected on a predesigned proforma. Each mother was given a KMC bag specially tailored, made up of a soft flannel cloth. Salter weighing scale (Salter India Ltd) with 100 g sensitivity was used to weigh the infants. The feasibility of the study was assessed by the proportion of women counselled accepting the method. In the absence of any clear-cut definition, acceptability was defined as practicing skin-to-skin contact by mother/caregiver for any duration. Acceptability was also assessed on day 7 after initiation of KMC using a questionnaire incorporating Likert scale.

*Qualitative survey:* Focus group discussions (FGDs), one amongst each stakeholder's mothers, mothers-in-law and healthcare providers (ANMs and AWWs) before imparting KMC training and after provision of KMC, were carried out. Five in-depth interviews in each group of mothers practicing KMC for short and long durations were conducted to understand barriers and facilitating factors.

*Statistical analysis:* Analysis was performed using STATA software version 11.0 (StataCorp, College Station, Texas, US). All variables were tabulated in numbers and percentages.

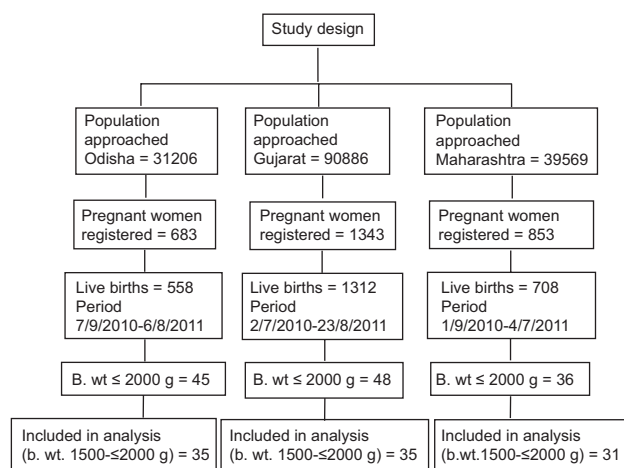
## Results

In three sites, a total of 2879 pregnant women were registered. Of the 2578 live births at three sites, 129 (5.0%) infants weighed 2000 g or less; of them 28 were excluded for not fulfilling inclusion criteria: b.wt <1500

g (15), mother in shock due to septicaemia (1), delivered in maternal home and continued to stay there (1), health worker did not inform after delivery (1), migrated to maternal home within two days of delivery (1), ANM came to know on the seventh day of delivery (1) and informed on 15<sup>th</sup> day after birth, died in the hospital two days after delivery (3), discharged from hospital after seven days of delivery (5). In total, 101 infants weighing 1500-2000 g were included in the analysis (Figure).

*Maternal demographic and neonatal characteristics:* Maternal demographic, delivery and neonatal characteristics are given in Table I. Mean age of mothers ranged between 23.0±5.6 and 25.3±3.8 yr; 35.6 per cent mothers were illiterate and 47.5 per cent had education high school and above. Nearly two-third of the women (61.4%) were primipara, 74.0 per cent were housewives and 61.4 per cent lived in joint family. In Maharashtra, nearly half (51.6%) of the women lived in nuclear family and more than half (56.7%) worked as unskilled labourer. Majority of deliveries (n=85, 84.2%) took place in institutions; in Gujarat, 82.9 per cent (n=29) deliveries took place in private hospitals, and in Maharashtra, 35.5 per cent (n=11) were home deliveries. Mean birth weight ranged from 1700±102.9 to 1837±173.4 g; more than half (n=58, 57.4%) newborns were born premature (<37 wk of gestation). Proportion of preterm delivery was highest in Maharashtra (n=22, 71.0%).

*Newborn care practices:* Breastfeeding was initiated within 24 h in 84.9 per cent (n=84) infants. In Gujarat, 41.1 per cent (n=14) newborns were breastfed after 24 h of delivery. First bath to the newborn was given after 48 h of birth in 71.3 per cent (n=72) cases.



**Figure.** Flow diagram showing study design.

**Table I.** Maternal demographic, delivery and neonatal characteristics

Characteristics	Cuttack (Odisha) (n=35)	Anand (Gujarat) (n=35)	Rajgarh and Kalamb (Maharashtra) (n=31)	Total (n=101)
Age of women (yr)	23±5.5	23.5±3.6	25.3±3.8	24.0±4.5
Education: High school and above	16 (45.7)	20 (57.1)	12 (38.7)	48 (47.5)
Occupation: Housewife	32 (91.4)	29 (82.9)	13 (43.3)	74 (73.3)
Lived in joint family	26 (74.3)	21 (61.8)	15 (48.4)	62 (61.4)
Primipara	24 (68.6)	22 (62.9)	16 (51.6)	62 (61.4)
Institutional delivery	32 (91.4)	33 (94.3)	20 (64.5)	85 (84.1)
Delivery by skilled personnel	32 (91.4)	33 (97.1)	20 (67.7)	85 (84.1)
Preterm	18 (51.4)	18 (51.4)	22 (71.0)	58 (57.4)
Body weight (mean±SD) (g)	1700±102.9	1748±170.9	1837±173.7	1759±160.4

Figures in parentheses are percentages. SD, standard deviation

**Table II.** Details of IEC (information, education & communication) sessions on kangaroo mother care and acceptability of the method

Counselling on KMC	Cuttack (n=35)	Gujarat (n=35)	Mumbai (n=31)	Total (n=101)
<b>During antenatal period</b>				
1-2 times	10 (28.4)	9 (25.7)	21 (67.7)	40 (39.6)
3 or more times	25 (71.3)	6 (7.1)	10 (32.2)	41 (40.6)
Not received at all	-	20 (57.1)	-	20 (19.8)
<b>Family members received IEC</b>				
Once only	5 (14.3)	7 (20.0)	15 (48.4)	27 (26.7)
Twice	3 (8.6)	1 (2.9)	4 (12.9)	8 (7.9)
Three times or more times	27 (77.1)	7 (20.0)	-	34 (33.7)
Not received	--	20 (57.1)	12 (38.7)	32 (31.7)
<b>Counselling postnatal period</b>				
1-2 times	2 (5.7)	24 (68.6)	28 (90.4)	54 (53.5)
Three times	33 (94.3)	9 (25.7)	2 (6.4)	44 (43.6)
Did not receive	-	2 (5.7)	1 (3.2)	3 (2.9)
<b>Acceptability of KMC</b>				
<b>Time of initiation of KMC</b>				
Within 24 h	14 (40.0)	4 (11.4)	4 (12.9)	22 (21.8)
24 to <72 h	18 (51.4)	6 (17.1)	10 (32.3)	34 (33.7)
72 h to <one week	3 (8.6)	11 (31.4)	17 (54.8)	31 (30.7)
>one week	-	14 (40.0)	-	14 (13.9)
Number of hours of KMC/day (median)	8	4	3	5
Total number of days KMC given (mean±SD)	34.4±5.7	44.3±17.2	26.2±14.9	
Family member provided KMC	12 (34.3)	6 (18.7)	8 (25.8)	26 (26.5)
Suggest KMC to others	35 (100.0)	32 (91.4)	28 (90.3)	95 (94.1)

Figures in parentheses are percentages. KMC, kangaroo mother care; SD, standard deviation

*IEC sessions and initiation of kangaroo mother care (KMC) after birth:* Majority (n=81, 80.2%) of the pregnant women attended IEC sessions during antenatal period; in more than two-third (n=69, 68.3%) of the

cases, family members also attended the IEC sessions; 97.0 per cent (n=98) mothers received IEC during postnatal period also. There was no refusal; all mothers initiated KMC following delivery; 21.8 per cent (n=22)



within 24 h, 55.4 per cent (n=56) within 72 h and 13.9 per cent (n=14) after one week (Table II). All mothers practiced KMC intermittently; maximum duration (median) of practice/day was eight hours (Odisha) and minimum three hours (Maharashtra). Most mothers provided KMC for a mean duration of 34.3, 44.3 and 26.1 days in Odisha, Gujarat and Maharashtra, respectively. Family members also provided KMC in 26.5 per cent (n=26) cases.

Acceptability was also assessed in 10-point Likert scale on day 7 of initiation of KMC. Majority (n=73) of the mothers felt that KMC did not interfere with daily activities, it was possible to practice KMC for a longer time (n=67) and they were confident in looking after the infant at home (n=86). Majority of mothers (n=87) were happy about the process and said that they would prefer to provide care to small infants at home in future. Distribution of responses for all questions showed concentration at 'yes' and 'very much' across the sites irrespective of the place of delivery.

Most (n=91, 94.7%) mothers experienced no difficulty while practicing KMC; 5.2 per cent mothers (n=5) reported back pain during KMC while sitting for a longer time in one place; pain in body, neck, knee, hand; cough, fever and weakness problems. Problems in neonates included fast breathing, cold to touch, yellow skin, sticky eyes vomiting after feeds and poor sucking. Four infants died during the study period. Of the two deaths in Maharashtra, one newborn had congenital heart disease, whereas the other had high fever. Two infants in Gujarat had intrauterine growth retardation.

*Results of qualitative survey:* After counselling, most mothers had a good understanding of the information provided to them on KMC, and they could demonstrate a right position. They were happy with the method and said they would prefer to use KMC if their next infant is born LBW. In Maharashtra, most mothers initiated KMC on day 2-5 of delivery and continued approximately for a month, while two mothers provided only for 15 days. Most of the mothers lived in nuclear family, had to perform household work, sowing seeds, look after older children, *etc.*, hence they could not provide KMC for a longer time.

Most mothers-in-law and sisters-in-law provided KMC in Odisha, and their experience was pleasant and satisfactory. Male members were afraid of handling small infants, and were reluctant to practice; still three fathers managed to keep their infants in KMC position, two of them behind closed doors. In Maharashtra, only

two participants mentioned that males (fathers) gave KMC only once or twice.

Hot weather and lack of privacy were mentioned as major problems faced during KMC in Gujarat. Some mothers having delivery by caesarean section also complained of pain; difficulty in providing KMC for twin infants, while others found it difficult to handle very small infants in KMC position. Most mothers practiced KMC 2-4 h/day in the morning or evening hours when the temperature is relatively cool. In Odisha, most mothers practiced KMC for eight hours/day. Living in joint family and family support and perceived benefit of KMC such as good latching, exclusive breastfeeding and weight gain appeared to be major facilitating factor for prolonged practice.

Majority of mothers reported that they had difficulty to take newborns in KMC bag initially but afterwards they got used to it.

## Discussion

The study results showed that KMC was acceptable to most mothers. There was no refusal; however, the time of initiation and duration of practice of KMC varied across the sites. The beneficial effect of KMC as an alternative to facility-based care has been demonstrated in several studies. However, use of this method is restricted to hospitals only. In a study in Bangladesh, 77 per cent of 35 expectant or recently delivered mothers trained by community-based workers were found to initiate KMC when interviewed later<sup>10</sup>. In our pilot study, all mothers continued KMC once initiated although duration of practice varied across the sites. Acceptance of skin-to-skin care promoted in intervention arms through community mobilization, and behaviour change communication was found to be nearly universal after a few months of programme implementation compared to the comparison arm in rural Uttar Pradesh<sup>11</sup>. In a longitudinal study in Ghana, it was observed that once initiated in the hospital mothers continued KMC practice at home<sup>12</sup>. In contrary, in a large trial carried out in a sub-Saharan African community setting, only 7.5 per cent practiced skin-to-skin care for more than two hours<sup>13</sup>; most mothers said KMC hampered daily routine, some complained of chest and back discomfort. We observed similar finding in tribal areas in Maharashtra, where most women lived in nuclear families, could not practice KMC for a longer duration due to lack of family support and household work. These findings were also consistent

with findings of another study from Bangladesh that highlighted women's heavy burden of domestic work as the most important perceived barrier for community level delivery of KMC<sup>14</sup>.

KMC has been included as one of the key interventions for the reduction of newborn morbidity and mortality in the global health agenda, but not much progress has been made in KMC uptake and service coverage<sup>15</sup>. A case study of institutionalization of facility-based KMC services in three Asian countries (India, Indonesia and the Philippines) has highlighted complexities of implementing new healthcare intervention and the reasons for the slow uptake of KMC in these countries<sup>16</sup>. In a recently published study from Gujarat, importance of champion for administration and quality of skin-to-skin care has been highlighted. Decline in early initiation and duration of KMC was observed when champions were withdrawn<sup>17</sup>.

The study was not designed to have a control group for calculating statistical inference which might be seen as a limitation. Another limitation was small sample size. However, strength of our study was that the existing health infrastructure and personnel for IEC were involved; the study was conducted in different population groups in rural, urban and rural tribal areas with different cultures and climatic conditions. Mothers were followed up from pregnancy onwards and, both quantitative and qualitative methods were used.

Skin-to-skin care has been considered as a priority intervention in the strategic document of Government of India *i.e.* 'India Newborn Action Plan' to achieve single digit neonatal mortality by 2030<sup>18</sup>. The operational guidelines of Ministry of Health & Family Welfare for programme managers and service providers for facility-based KMC also emphasize continuation of KMC at home linked to home-based care and follow up of the infant by ASHA worker<sup>8</sup>.

In conclusion, this pilot study findings indicated that it would be possible to promote KMC using the existing infrastructure and the method was acceptable to most mothers. Further research is needed to evaluate acceptability while scaling up KMC in community at larger scale, addressing barriers to the practice of KMC, optimum time of initiation and duration of KMC and impact of community-based KMC in reducing neonatal mortality.

### Acknowledgment

Authors acknowledge all members of the Steering group: H.P.S. Sachdev, V.K. Paul, A.K. Deorari, R. Nanavati, (Late

G.K. Malik, V. Kumar, R. Agarwal. Centralized training: AIIMS KMC Network Centre, V. Kumar & his team, Community Empowerment Lab Uttar Pradesh and project staff at participating centers. Authors also acknowledge the contribution of Ms. Garima Sharma for data management and data analysis and Dr Ramesh Agarwal in data analysis, and support of District health officials and child development project officer (CDPOs) of the respective States and *anganwadi* workers, auxiliary nurse midwives (ANM), accredited social health activist (ASHAs) and traditional birth attendants (TBAs). The authors also acknowledge the Indian Council of Medical Research, New Delhi, for financial support.

**Conflicts of Interest:** None.

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