



Original Research Article

Impact of Kangaroo mother care on the maintenance of temperature and weight gain of newly born low birth weight babies

Purnima Margekar^{1,*}, Premlata Parekh¹, Shubha Laxmi Margekar²

¹Dept. of Pediatrics, Sri Aurobindo Institute of Medical Sciences, Indore, Madhya Pradesh, India

²Dept. of Medicine, Lady Hardinge Medical College, New Delhi, India



ARTICLE INFO

Article history:

Received 10-10-2020

Accepted 05-12-2020

Available online 13-03-2021

Keywords:

Weight gain

Kangaroo mother care

Very low birth weight

ABSTRACT

Background: In preterm and LBW infants, skin-to-skin contact between the mother and her infant decreases maternal postpartum depressive symptoms and improves self-efficacy and mother-child bonding. However, evidence supporting it is lacking.

Aims and Objectives: To evaluate the impact of Kangaroo Mother Care (KMC) on the maintenance of temperature and weight gain of newly born low birth weight babies.

Materials and Methods: Fifty newborn babies weighing less than 1.8 kgs were studied at a tertiary level neonatal intensive care unit (NICU) from August 2013 to August 2014. An equal number of new-borns from the same setting, matched for weight and gestational age received routine care (warmer) and acted as controls. A special bag or kangaroo pouch was designed to keep the baby in close contact with the mother to provide KMC. Weight gain and temperature maintenance were studied.

Results: Maximum number of cases and control was 1-10 days old. A maximum number of cases and controls were babies between 1.251 to 1.800 kgs i.e. 70% and 72% respectively. In the KMC group, the majority (52%) had weight gain between 100-200gm, while in the control group 52% of subjects had weight gain between 0-100 gm. Maximum number of babies in KMC group (52%) gained 15.1-20gm/day vs 0-5 gm/day in controls (42%). 70% of the KMC group while 66% of the control group was discharged between 1.25-1.5 kg weight. The pre-intervention mean temperature in neonates of the case group was 35.99 ± 0.59 °F, while the post-intervention mean temperature in the case of group neonates was 37.01 ± 0.22 °F. Thus, the neonates in the case group had gained temperature after the intervention ($p < 0.001$).

Conclusion: The babies in the KMC group demonstrated more weight gain and temperature.

© This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. Introduction

Kangaroo Mother Care (KMC) was first initiated by Rey and Martinez in Bogota, Colombia for low birth weight infants in 1979.¹ Factor that prompted this method of care was a shortage of staff and equipment, unacceptably high mortality and infection rate in the neonatal unit, and overcrowding in the hospitals.²

In developing countries like ours, $1/3^{rd}$ of babies delivered are LBW. Hypothermia is a major cause of morbidity and mortality in this group of neonates.³

Maintaining the temperature of such babies over a prolonged period of time is difficult due to lack of warmers and incubators at health facilities, the extreme paucity of nursing personnel at all levels, the hospital beds are inadequate for accommodating a large number of babies and mothers for several weeks and keeping the mother and baby in the hospital for long is not feasible as it disrupts the functioning of the entire family.⁴

KMC is an evidence based technology proposed as "alternate care for LBW infants" which might be employed to ameliorate the effect of LBW on mortality and morbidity. For many small preterm infants, receiving prolonged medical care is important. However, kangaroo mother care

* Corresponding author.

E-mail address: dr_purnima2010@yahoo.com (P. Margekar).

(KMC) is an effective way to meet baby's needs for warmth, breastfeeding, protection from infection, stimulation, safety, and love.⁵

The mother in this program acts as an incubator through the skin to skin contact. This enables the baby to be discharged earlier, with fewer complications and the mother can continue to care for her baby at home. Despite the said advantages of KMC, it is still not a widely practiced method of care of LBW infants in India. In the present study, we evaluated the impact of KMC on the maintenance of temperature and weight gain of newly born low birth weight babies.

2. Materials and Methods

The present prospective case-control study was conducted in a teaching institution with a tertiary level neonatal intensive care unit (NICU). The study extended over a 12 month period from August 2013 to August 2014, including 50 new-borns weighing less than 1.8 kgs. An equal number of new-borns from the same setting, matched for weight and gestational age received routine care (warmer) and acted as controls.

A special bag or kangaroo pouch was designed to keep the baby in close contact with the mother to provide KMC. The outcome variable studied were weight gain and temperature maintenance. Observations were recorded in a proforma specially designed for the study. The results were subjected to statistical analysis.

Babies having a weight >1800gm, sick unstable new-borns, new-born needing ventilator care, and new-born with major congenital malformation were excluded from the present study.

The minimum duration of stay in each group is 6 days from the inclusion in the study, if a case or control got discharged or left against medical advice before 6 days they were excluded from the study. A minimum of 6 hrs of KMC was mandatory in the KMC group. If the mother failed to do so then they were excluded from the study. At any time if a mother did not want to continue, they were excluded from the study.

Detailed history along with routine clinical examination was performed. Axillary temperature was taken by Hicks thermometer kept in the roof of the axilla for at least three minutes. The lowest temperature in our thermometer was 35° C (95°F).

2.1. Weight

In both groups, birth weight and weight at admission to KMC were noted. The weight of the baby was recorded on an electronic weighing machine with an accuracy of 5 gms. Weight was taken after removing all of the baby's clothes (i.e. naked baby weight) and at least 2 hrs after the last feed.

2.2. Head circumference

Head circumference was recorded by Chinese type centimeter tape with an accuracy of 0.1cm. The Head circumference was taken as the maximum occipital-frontal circumference.

2.3. Gestational age

Gestational age assessment was done according to the Expanded New Ballard Score. Gestational age is expressed in weeks; accordingly, neonates are classified as term and preterm.

The mothers were motivated by KMC. KMC rules were explained. A mother who was ready to do KMC was allocated to the KMC group and those who refused were allocated to the control group. Randomization was not possible due to a lack of resources & institutional problems. Along with that all the kangaroo rules and guidelines for Kangaroo's position, Kangaroo nutrition, and Support to mother-infant diet were taken care of. Prophylactic treatment of multivitamins & calcium and vitamin K was also given.

2.4. Follow-up

When the baby was included in the KMC group or control group he/she was observed daily. Weight, temperature, and complete clinical examination was done in minimum time to prevent hypothermia. Duration of SSC (skin to skin contact) (in hours/day), mother holding the baby in Kangaroo position was noted down. Minimum 6 hrs/day KMC was provided to the baby. If any problem was detected during the course of KMC, either it was rectified or the baby was excluded from the study.

2.5. Statistical analysis

All the data analysis was performed using SPSS ver. 20 software. Quantitative variables were expressed as number whereas categorical variables were expressed as a number. The mean was compared using a paired t-test. A p-value of <0.05 was considered significant.

3. Results

In both Cases and Control group, the majority of the babies (94%) were delivered by the vaginal route and 6% by LSCS.

In Cases, the majority of the babies had a gestation age of 34 weeks whereas among the controlling majority of the babies had a gestation age of 32 weeks. In the KMC group, Preterm AFD and Preterm SFD were 48% and 52% respectively. And in the Control group, Preterm AFD and Preterm SFD were 42% and 58% respectively

The maximum number of cases and control were 1-10 days old when included in the study. The maximum number of cases and controls were babies between 1.251 to 1.800

kgs i.e 70% and 72% respectively. While in between 1 to 1.250 kgs, the cases and control were 26% and 28% respectively.

The maximum number of cases and controls were babies between 1.251 to 1.500 kgs. i.e. 54% and 66% respectively.

Table 1: Distribution according to weight gain/loss (In grams)

Weight gain /loss (in gms)	Cases [n (%)]	Control [n (%)]
Weight loss	0 (0)	5 (10)
0-100 Weight gain	3 (6)	26 (52)
100-200 Weight gain	26 (52)	13 (26)
200-300 Weight gain	15 (30)	5 (10)
>300 Weight gain	6 (12)	2 (2)
Total	50 (100)	50 (100)

Data is expressed as no of subjects (%)

Table 2: Distribution according to average weight gain/loss per day

Weighty gain/loss per day	Cases [n (%)]	Control [n (%)]
Weight loss	0 (0)	5 (10)
0-5gm	0 (0)	21 (52)
6-10gm	2 (4)	19 (38)
11-15gm	14 (28)	4 (8)
16-20gm	26 (52)	1 (2)
21-25gm	8 (16)	0 (0)
Total	50 (100)	50 (100)

Data is expressed as no of subjects (%)

4. Discussion

Low birth weight (LBW)/ preterm babies are associated with high neonatal / infant mortality and morbidity. Of the estimated 4 million neonatal deaths, LBW/preterm infant's accounts for more than 33%, hypothermia, and infections are frequent aggravating factors for poor outcome of premature / LBW babies. Incubators, open care systems, warmers used in conventional care are expensive and their maintenance and repair are difficult.⁶

Kangaroo mother care is an effective way to meet baby's needs for warmth, growth, well-being, breastfeeding, protection from infection, stimulation, safety, and love. Hence this study is to assess the effect and benefits of Kangaroo mother care in low birth weight babies.

In this study sensitization of mother for kangaroo mother care was done while educating, encouraging, and promoting early skin to skin contact between mother and baby. This was reinforced during neonatal care as the baby was stabilized. Thereby, this study was conducted in neonates with low birth weight to find out the beneficial effect of kangaroo mother care in temperature regulation, growth, mother to infant bonding, and exclusive breastfeeding.

Low birth weight babies frequently show an exaggerated weight loss and slower weight gain in the postnatal period due to inadequate caloric intake, frequent illness, hypothermia, and occult sepsis. Therefore require Kangaroo Mother Care for a better weight gain which can be seen in our study.

In the KMC group, 52% of weight gain was between 100-200 gm, while in the control group 52% of weight gain was between 0-100gm. Babies in KMC has a better average weight gain per day as compared to the control group. An observation similar to ours was made by Deorari et al. who reported better weight gain after the first week of life in the KMC group than the control group (15.9±4.5 vs 10.6±4.5 gm/day).⁷ Suman Roa et al. found that KMC babies had better average weight gain per day (KMC: 23.99 g vs CMC: 15.58 g, P<0.0001).⁸ Ali et al. also reported that KMC infants had a better weight gain per day than the control group infants during the hospital stay (control: 10.4±4.8 grams, KMC: 19.3±3.8 grams p<0.001).⁹ Conversely, Solan reported no difference between the KMC group and the control group in weight gain.¹⁰

Babies in incubator care or warmer care are subjected to swings of temperature. Swing in temperature leads to apneic spells and increased caloric expenditure. A baby kept in Kangaroo Mother Care has almost no swings in temperature and the temperature remains constant at 37⁰c.

If the baby's temperature in Kangaroo mother care decreases then the temperature of the skin of mother in contact with the baby goes up to warm up the baby rapidly. If the baby's temperature increases, the mother's skin temperature decreases. This phenomenon is called "Thermal Synchrony". Therefore the thermoregulation in Kangaroo mother care is far superior as compared to other means of keeping the baby warm (radiant warmer, heater blubs, and incubator). In our study, the pre-intervention mean temperature in neonates of the case group was 35.99 ± 0.59 °F, while the post-intervention mean temperature in case group neonates was 37.01 ± 0.22 °F. Thus, the neonates in the case group had gained temperature after the intervention. No episode of apnea and hypothermia was reported in the KMC group.

The positives realized were as follows; mothers were able to understand and implement KMC with simple and clear oral instructions in the local language. Positive feelings like closeness to the baby and feeling of goodness were noted among the mothers since the very first day. KMC has a place of its own even in high tech environments such as ours. The mother of the KMC cases felt physically and emotionally closer to their babies and more confident in handling them as compared to the controls; as judged by the interactions of our health staff with them.

Table 3: Showing pre and post-intervention temperature gain in the neonates in both the Case (KMC) Group

	Pre-intervention	Post-intervention	't' value	P-value
Case (KMC) Group	35.99 ± 0.59	37.01 ± 0.22	14.68	0.0001

Table 4: Showing pre and post-intervention weight gain in the neonates in both the case and control groups

Group	Pre-intervention	Post-intervention	't' value	P-value
Case	1.27 ± 0.12	1.47 ± 0.07	16.17	0.0001
Control	1.31 ± 0.16	1.39 ± 0.14	6.01	0.0001
't' value; p-value		3.63; 0.0005		

5. Conclusion

The babies in the KMC group demonstrated more weight gain and temperature. Thus we conclude that KMC is a useful method of caring for VLBW baby in respect of early weight gain and gaining temperature in our set up. But there is still insufficient evidence to recommend its routine use in VLBW babies in our country. A well-designed large randomized controlled trial of this intervention is needed.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare that there is no conflict of interest

References

1. Akhtar K, Haque M, Khatoon S. Kangaroo Mother Care: A Simple Method to Care for Low-Birth-Weight Infants in Developing Countries. *J Shaheed Suhrawardy Med Coll.* 2013;5(1):49–54. doi:10.3329/jssmc.v5i1.16256.
2. Shrivastava SR, Shrivastava PS, Ramasamy J. Utility of kangaroo mother care in preterm and low birthweight infants. *S Afr Family Pract.* 2013;55(4):340–4. doi:10.1080/20786204.2013.10874373.
3. Moore ER, Bergman N, Anderson GC, Medley N. Early skin-to-skin contact for mothers and their healthy newborn infants. *Cochrane Database Syst Rev.* 2016;11:3519. doi:10.1002/14651858.cd003519.pub4.
4. Sloan NL, Ahmed S, Mitra SN, Choudhury N, Chowdhury M, Rob U, et al. Community-Based Kangaroo Mother Care to Prevent Neonatal and Infant Mortality: A Randomized, Controlled Cluster

Trial. *Pediatr.* 2008;121(5):e1047–59. doi:10.1542/peds.2007-0076.

5. Srivastava S, Gupta A, Bhatnagar A, Dutta S. Effect of very early skin to skin contact on success at breastfeeding and preventing early hypothermia in neonates. *Indian J Public Health.* 2014;58(1):22. doi:10.4103/0019-557x.128160.
6. Mekonnen AG, Yehualashet SS, Bayleyegn AD. The effects of kangaroo mother care on the time to breastfeeding initiation among preterm and LBW infants: a meta-analysis of published studies. *Int Breastfeed J.* 2019;14(1):12. doi:10.1186/s13006-019-0206-0.
7. Deorari AK, Paul VK, Ramanathan K. Physiological and clinical benefits of Kangaroo mother care: Impression from a tertiary care newborn nursery in Delhi. *Indian J Pediatr.* 2001;68(11):1–8.
8. Suman RPN, Udani P, Nanavati R. Kangaroo mother care for lowbirth weight infants: a randomized controlled trial. *Indian Pediatr.* 2008;45(1):17–23.
9. Ali SM, Sharma J, Sharma R, Alam S. Kangaroo mother care as compared to conventional care for low birth weight babies. *Dicle Med J.* 2009;36(3):155–60.
10. Sloan. Effect of Kangaroo mother care on growth indices during the six month follow up; 1994.

Author biography

Purnima Margekar, Ex-PG Resident

Premlata Parekh, Professor

Shubha Laxmi Margekar, Professor

Cite this article: Margekar P, Parekh P, Margekar SL. Impact of Kangaroo mother care on the maintenance of temperature and weight gain of newly born low birth weight babies. *Indian J Obstet Gynecol Res* 2021;8(1):86-89.