

Effect of Kangaroo Mother Care on weight gain in preterm neonates: Experience of a tertiary care hospital

MA Kamal¹

Abstract

Background: Preterm low birth weight babies are at high risk for complications including poor weight gain, hypothermia and infections. Kangaroo Mother Care (KMC), a simple, low-cost intervention, has shown promise in improving neonatal outcomes in resource-limited settings.

Objectives: To evaluate how KMC affects preterm LBW weight gain.

Methodology: This randomized controlled trial study was conducted in neonatal ward of Bangladesh Shishu (Children) Hospital & Institute, Dhaka, Bangladesh from January 2023 to December 2023. Total 100 preterm neonates with birth weight 1250gm to 1800gm, gestational age >30 weeks to <35 weeks were included in this study. Neonates in this study were randomly enrolled by inclusions and exclusions criteria and were allocated either KMC group or control group by simple randomization with concealed sealed envelope technique. Fifty neonates (50) were in KMC group and 50 were in control group. Babies having major life threatening congenital malformation, perinatal asphyxia and required ventilator or ion tropic support and babies with critically ill mother were excluded.

Results: The KMC group's mean birth weight was 1452.0±90.9gm, while the control group's was 1461.0±115.3gm ($p>0.05$). At discharge, the experimental group's mean weight gain was 12.2±4.1gm, while the control group was 8.7±3.3gm. Neonates in the KMC group had significantly higher daily weight gain compared to the control group ($p<0.001$). The KMC group also experienced fewer complications, including hypothermia, hypoglycemia, apnea, and sepsis. Additionally, the average hospital stay was shorter in the KMC group (14.5±4.1 days) versus the control group (16.9±5.4 days; $p=0.01$).

Conclusion: KMC significantly improves weight gain, reduces complications, and shortens hospital stay among preterm neonates.

Keywords: Kangaroo Mother Care, Weight gain, LBW babies, Preterm neonates.

¹ Associate Professor (CC)
Department of Neonatal
Medicine
Bangladesh Shishu Hospital &
Institute, Dhaka

Correspondence

Dr. MA Kamal
Associate Professor (CC)
Department of Neonatal
Medicine
Bangladesh Shishu Hospital &
Institute, Sher-E-Bangla
Nagar, Dhaka-1207
Bangladesh
e-mail: makamaldr09gmail.com

DOI:

<https://doi.org/10.3329/dshj.v40i2.92646>

Received : 10 March 2024

Revised : 31 March 2024

Accepted : 2 April 2024

Introduction

Kangaroo mother care (KMC) is a simple and cost-effective intervention that decreases neonatal mortality and the risk of infection in low-birth-weight infants. The WHO recommends the initiation of KMC among low birth weight infants after clinical stabilization.¹ Kangaroo care (KC), a humanistic technique, was developed in the late 1970s in Bogota, Colombia, as a solution to the neonatal intensive care unit (NICU) inability to maintain premature baby's body temperatures when incubators were insufficient.² This skin-to-skin contact allows the continuation of the parent's warmth and love for the child, which is essential for the child's growth.³ Due to the enormous advantages of KC in creating a balance of physiological indices and enhancing psychological status, its uniqueness has gained global acceptance.⁴ KMC helps in exclusive breastfeeding (early initiation and greater milk production) and positive psychosocial impacts (less anxiety, more maternal satisfaction) and enhanced connection and bonding between the mother and her newborn. All these are the positive outcomes for mothers.

Failure to gain weight during hospitalization and later is a significant problem predominantly in low-resource countries.⁵ Lack of knowledge regarding proper breast-feeding techniques, late introduction of feeding, improper dilution, infections,

problems with digestion, increased length of stay and lack of resources are common causes of reduced weight-gain among the neonates.^{6,7} Multiple interventions are applied to address the issues of weight gain, including exclusive breast feeding, tube feeding with expressed breast milk (EBM), kangaroo mother care (KMC), and, where feedings are contraindicated, babies are administered total parenteral nutrition (TPN).^{8,9} The purpose of this study was to evaluate the impact of KMC on weight gain in LBW newborns.

Materials and Methods

This randomized controlled trial study was conducted in the neonatal ward of Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh from January, 2023 to December 2023. All preterm, neonates with birth weight 1250 gm to 1800 gm, gestational age >30 weeks to <35 weeks, haemodynamically stable normal heart rate 100-160 per minutes, respiratory rate 30-59 per minute with breaths comfortably, no sign of respiratory distress, pink in room air or with 40% oxygen, no prolonged or frequent apnea were included in this study. Babies having major life-threatening congenital malformation, perinatal asphyxia and required ventilator or inotropic support and babies with critically ill mother were excluded. Neonates in this study were randomly enrolled by inclusions and exclusions criteria and were allocated either KMC group or control group by simple randomization with concealed sealed envelope technique. Fifty neonates were in KMC group and 50 neonates were in control group. Neonates in control group were managed under radiant warmer. A written informed consent was obtained from all mothers. Details of antenatal period and delivery were recorded. During hospital stay, both the groups were monitored for daily weight gain, episodes of hypothermia, apnea, nosocomial infection, physiological parameters (heart rate, respiratory rate, axillary temperature and oxygen saturation). Data regarding feeding was also recorded. All information was recorded into a follow up sheet. In KMC group mother or caregiver was explained in detail about KMC adoption in presence of their family. KMC was initiated as soon as the baby was stable. If the mother was not available, KMC was started with the help of any other family member. In KMC position, baby was kept skin to skin contact with mother bare chest in between the breasts. Baby remained froglike position, head turned in one side with neck slight extended, wearing front open sleeveless shirt, cap, socks and a nappy. Comfortable bed or chair was provided to the mother or caregiver

practicing KMC in ward. KMC was given at least 2 hours at a time and at least 12 hours in a day. When the baby was not in KMC, the baby placed it in cot with adequate cloths and coverings. Infants in both the groups were discharged when following criteria were achieved: Baby's general health was good, no evidence of infection and no I/V medications. Baby was feeding well and receiving breast milk directly or by cup and spoon gaining weight (at least 15gm/kg/day) for 3 consecutive days. Maintaining body temperature well without assistance for at least 3 consecutive days and mother and family members were confident to care the baby. Besides KMC and radiant warmer care, babies of both groups were treated with conventional hospital protocol. Data were analyzed by chi-square (χ^2) test, unpaired student's 't' test with the help of SPSS version 25.

Results

Common maternal age was found between 21 to 30 years in both experimental and control groups. Most of the mothers were housewife in both groups. No significant difference was found in educational status and history of abortion between experimental and control group ($p>0.05$) (Table I).

Table I: Maternal sociodemographic profile of the study participants (n=100)

	KMC group		Control		p-value
	n	%	n	%	
Maternal age (years)					
≤20	4	8.0	5	10.0	0.858
21-25	20	40.0	16	32.0	
26-30	20	40.0	23	46.0	
>30	6	12.0	6	12.0	
Occupation					
Housewife	43	86.0	39	78.0	0.298
Service holder	7	14.0	11	22.0	
Education					
Primary	23	46.0	21	42.0	0.919
Secondary	12	24.0	16	32.0	
SSC	7	14.0	6	12.0	
HSC	5	10.0	5	10.0	
Graduate	3	6.0	2	4.0	

The majority of babies who were enrolled in the study were younger than 5 days. There were 26 (52%) in the experimental group and 35 (70%) in the control group ($p>0.05$). There were 29 male babies (58%) in the KMC group and 26 male babies (52%), in the control group. Gestational ages greater than 32 were present in 38 (78%) of the experimental group and 44 (68%) of the control group ($p>0.05$). The majority of 38 (76%) and 34 (68%),

respectively, were born by LUCS. The APGAR scores of the two groups at 5 minutes < 7 were 12 (24%) in the control group and 15 (30%) in the experimental group, respectively (Table II).

Table II: Neonatal finding of the study participants (n=100)

	KMC group		Control		p-value
	n	%	n	%	
Age (days)					
≤5	26	52.0	35	70.0	0.176
6-10	20	40.0	13	26.0	
>10	4	8.0	2	4.0	
Sex					
Male	29	58.0	26	52.0	0.316
Female	21	42.0	24	48.0	
Gestational age (weeks)					
30 - ≤32	11	22.0	6	12.0	0.168
>32 - <35	38	78.0	44	88.0	
Born by					
Normal delivery	12	24.0	16	32.0	0.373
LUCS	38	76.0	34	68.0	
APGAR score at 5 min					
<7	15	30.0	12	24.0	0.499
≥7	35	70.0	38	76.0	

According to the table, the KMC group's mean birth weight was 1452.0±90.9 gm, while the control group was 1461.0±115.3 gm ($p>0.05$). The KMC group's mean discharge weight was 1630.0±129.4gm, while the control group was 1587.0±121.1gm ($p>0.05$). At discharge, the KMC group's mean weight gain was 12.2±4.1 gm while the control group was 8.7±3.3 gm ($p<0.001$). At discharge, the KMC group had significantly gained weight compared to the control group (Table III).

Table III: Weight of the study participants during admission and discharge (n=100)

	KMC group Mean ±SD	Control Mean ±SD	p-value
Birth weight (gm)	1452.0±90.9	1461.0±115.3	0.667
Discharge weight (gm)	1630.0±129.4	1587.0±121.1	0.089
Weight gain at discharge (gm)	12.2±4.1	8.7±3.3	0.001

In this study we found that the experimental group's mean length of hospital stay was 14.5±4.1 days, while the control group was 16.9±5.4 days ($p<0.01$). Hypothermia, hypoglycemia, apnoea, and sepsis were all substantially more common in the controlled group than in the experimental group 15 (30%) vs. 3 (6%) and 16 (32% vs. 4%), 12 (24% vs. 8%), and 16 (32% vs. 5%), respectively ($p<0.05$) (Table IV).

Table IV: Effect of the study participants (n=100)

	KMC group		Control		p-value
	n	%	n	%	
Hypothermia	3	6.0	15	30.0	0.002
Hyperthermia	5	10.0	7	14.0	0.538
Hypoglycemia	2	4.0	16	32.0	0.001
Apnea	4	8.0	12	24.0	0.029
Sepsis	5	10.0	16	32.0	0.007
Duration of hospital stay (days)	14.5±4.1		16.9±5.4		0.01

Discussion

This study evaluated the effect of Kangaroo Mother Care (KMC) on weight gain in preterm neonates with low birth weight. The findings support the growing evidence that KMC significantly improves neonatal outcomes, particularly weight gain, and reduces associated complications during hospital stay.

In this study, no statistically significant differences were found between the KMC and control groups in terms of maternal characteristics such as age, occupation, and educational status. These findings are consistent with studies by Mehrpisheh et al¹⁰ and Kashaninia et al¹¹, who also reported no significant maternal demographic differences between study groups.

Regarding neonatal characteristics, the majority of neonates in both groups were between 32 and 35 weeks of gestation, with no significant differences between the groups. This demographic distribution is comparable with the study by Rahman et al¹², who reported similar gestational profiles and no significant differences in baseline characteristics between study groups.

Weight gain, the primary outcome, was significantly higher in the KMC group compared to the control group. The mean daily weight gain at discharge was 12.2±4.1 g/day in the KMC group and 8.7±3.3 g/day in the control group ($p<0.001$). Similar findings were reported by Rahman et al.¹², who observed earlier weight recovery and greater weight gain among neonates receiving KMC. Suman et al.¹³ also demonstrated significantly improved weight gain in the KMC group (24.0 g vs. 15.6 g/day, $p<0.001$). These results are supported by a meta-analysis by Boundy et al.⁹ which showed that KMC enhances neonatal growth outcomes. Kashaninia et al.¹¹ and Moniem et al.¹⁴ reported that while initial weight gain differences between groups were not statistically significant, subsequent weeks showed a clear benefit in favor of KMC. Additionally, Keshavarz et al.¹⁵ observed

significant improvements in weight at discharge in KMC groups compared to controls, reinforcing the effectiveness of KMC in promoting healthy growth. Samra et al.⁵ on preterm infants with low birth weight, kangaroo care combined with breastfeeding resulted in a shorter duration of initial weight loss. They started gaining weight earlier, and the rate of daily weight gain was higher than in the non-kangaroo care control group. Also, in the study of Suman et al¹⁶ it was proved that kangaroo care is effective on the average daily weight gain of low-birth-weight infants.

The present study also found that KMC reduced common neonatal complications, including hypothermia, hypoglycemia, apnea, and sepsis. These findings align with those of Samra et al⁵ and Chowdhury et al¹⁷, who reported improved thermoregulation, enhanced immunity, and better feeding performance among neonates cared for with KMC.

In summary, this study supports existing literature demonstrating that KMC is a simple and safe intervention that promotes weight gain, minimizes complications, and reduces the duration of hospital stay in preterm low birth weight neonates. These benefits are especially crucial in resource-limited settings like Bangladesh, where access to incubators and advanced neonatal care is often constrained.

Conclusion

KMC significantly improves weight gain, reduces complications, and shortens hospital stay among preterm neonates. Its implementation should be encouraged in all NICUs, especially in resource-limited settings like Bangladesh.

References

1. Sivanandan S, Sankar MJ. Kangaroo mother care for preterm or low birth weight infants: a systematic review and meta-analysis. *BMJ global health* 2023;8:e010728.
2. Nieder-Heitmann E. The Impact Of A Sensory Developmental Care Programme for Very Low Birth Weight Preterm Infants in The Neonatal Intensive Care Unit [Doctoral dissertation]. University of Stellenbosch; 2010.
3. Nyqvist KH, Anderson GC, Bergman N, et al. Towards universal kangaroo mother care: recommendations and report from the first European conference and seventh international workshop on Kangaroo Mother Care. *Acta Paediatr* 2010;99:820-26.
4. Ludington-Hoe S, Morgan K, Abouelfetoh AM. A clinical guideline for implementation of kangaroo care with premature infants of 30 or more weeks' postmenstrual age. *Adv Neonatal Care* 2008;8:3-23.
5. Samra N, Taweel A, Cadwell K. Effect of intermittent kangaroo mother care on weight gain of low birth weight neonates with delayed weight gain. *J Perinat Educ* 2013;22:194-200.
6. Maruyama H, Yonemoto N, Kono Y, Kusuda S, Fujimura M. Neonatal Research Network of Japan. Weight Growth Velocity and Neurodevelopmental Outcomes in Extremely Low Birth Weight Infants. *PLoS One* 2015;10:e0139014.
7. Kumbhojkar S, Mokase Y, Sarawade S. Kangaroo Mother Care (KMC): An Alternative to Conventional Method of Care for Low Birth Weight Babies. *Int J Heal Sci Res* 2016;6:36-42.
8. Smith E, Bergelson I, Constantian S, Valsangkar B, Chan G. Barriers and enablers of health system adoption of kangaroo mother care: a systematic review of caregiver perspectives. *BMC Pediatr* 2017;17:2-16.
9. Boundy EO, Dastjerdi R, Spiegelman D, Fawzi WW, Missmer SA, Lieberman E, et al. Kangaroo Mother Care and Neonatal Outcomes: A Meta-analysis. *Pediatrics* 2016; 137:e20152238.
10. Mehrpisheh S, Doorandish Z, Farhadi R, Ahmadi M, Moafi M, Elyasi F. The Effectiveness of Kangaroo Mother Care (KMC) on attachment of mothers with premature infants. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 2022;15:100149.
11. Kashaninia Z, Dehghan M. The effect of kangaroo care on weight gain of premature neonates in hospitalized in neonatal intensive care units. *Biosciences Biotechnology Research Asia* 2015;12:1405-10.
12. Rahman M, Chowdhury MA, Hoque M, Jahan N, Shaha LC. Kangaroo mother care for low birth weight babies: a randomized controlled trial in a tertiary care hospital of Bangladesh. *J Pediatr Neonat Care* 2017;7:00285.
13. Suman Rao PN, Udani R, Nanavati R. Kangaroo mother care for low birth weight infants: a randomized controlled trial. *Indian pediatrics* 2008;45:17.
14. Moniem II, morsy MA. The effectiveness of kangaroo technique on preterm infant's weight gain. *Journal of American Science* 2011;7:697-702.
15. Keshavars M, Kiani A, Nasani L, Hoseini F. Effect of touch therapy by mothers on weight gaining of preterm newborns. *Koomesh* 2012;13:240-46.
16. Suman RP, Udani R, Nanavati R. Kangaroo mother care for low birth weight infants: A randomized controlled trial. *Indian Pediatr* 2008;45:17-23.
17. Chowdhury RM. Kangaroo Mother Care as compared to standard care for management of preterm low birth weight babies. MD Thesis, BSMMU, Dhaka. 2013