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Original Research Article

Effectiveness of Kangaroo Mother Care in Establishing Breastfeeding in Preterm Low Birth Neonates

Misbah Mushtaq*, Minahil Munir, Fariha Fazal, Rabia Shaukat, Asim Khurshid, Abdul Rehman Malik

Department of Paediatric Medicine, Children Hospital & Institute of Child Health, Multan, Pakistan
**Corresponding author`s email address:* misbahmushtaq@gmail.com

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Abstract: *The establishment of breastfeeding in preterm and low birth weight infants is often challenging due to immature physiological mechanisms and maternal difficulties.* ***Objectives:*** *To evaluate the effectiveness of kangaroo mother care in establishing successful first breastfeeding in preterm low birth weight neonates compared to standard care.* ***Methods:*** *This randomized controlled trial was conducted in the Department of Pediatrics at the Children's Hospital, Multan, over 6 months from January 2024 to June 2024, following CPSP synopsis approval. A total of 182 preterm, low-birth-weight infants were enrolled through nonprobability, consecutive sampling and randomly allocated to two equal groups. Group A received standard care under a radiant warmer, while Group B received KMC as per WHO guidelines. Successful first breastfeeding was defined as initiation of breastfeeding within two hours of delivery with an Infant Breastfeeding Assessment Tool (IBFAT) score >8. Data were analyzed using SPSS version 23. The chi-square test was applied, and the maternal and neonatal characteristics stratified results; significance was set at $p < 0.05$.* ***Results:*** *Successful first breastfeeding was achieved in 41 (45.1%) infants in Group A and 58 (63.7%) in Group B, with a statistically significant difference ($p = 0.012$). Stratified analysis revealed greater effectiveness of KMC among younger mothers, infants of lower gestational age, infants with lower birth weight, male infants, lower gravida, and infants with SVD deliveries.* ***Conclusion:*** *Kangaroo mother care was significantly more effective than standard care in establishing successful first breastfeeding in preterm low birth weight neonates. Routine adoption of KMC is recommended to improve neonatal feeding outcomes.*

Keywords: Breastfeeding, Kangaroo Mother Care, Low Birth Weight, Neonates, Preterm, Randomized Controlled Trial

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Introduction

Breastfeeding is universally recognized as the optimal source of nutrition for newborns, offering unparalleled health benefits for both infants and mothers (1). Early initiation of breastfeeding is especially crucial for preterm and low birth weight neonates, who are at increased risk of morbidity and mortality due to their physiological immaturity and vulnerability to infections, hypothermia, and feeding difficulties (2). The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) emphasize exclusive breastfeeding as a cornerstone strategy for reducing neonatal mortality and promoting growth, development, and immunity. Globally, around 44% of infants aged 0–6 months are exclusively breastfed, indicating that more than half miss out on the recommended exclusive breastfeeding period (3,4).

In recent decades, Kangaroo Mother Care (KMC) has emerged as an evidence-based, cost-effective, and feasible intervention that addresses many of the barriers faced by preterm, low-birth-weight neonates (5). Across 34 low- and middle-income countries, KMC prevalence among low birth-weight infants ranged markedly—from about 11% in Burundi to over 84% in Benin, with Pakistan reporting approximately 19.2% coverage (6). Originating in Colombia in the late 1970s as an alternative to incubator care in resource-limited settings, KMC is now globally endorsed as a standard of care for preterm infants. It involves continuous skin-to-skin contact between mother and infant, exclusive breastfeeding whenever possible, and early discharge with adequate follow-up. This close physical contact promotes physiological stability, enhances bonding, supports thermoregulation, and has been shown to improve weight gain and survival rates in vulnerable neonates (7).

The unique advantage of KMC lies in its direct impact on breastfeeding outcomes. Skin-to-skin contact stimulates oxytocin release in the mother, facilitating milk let-down and improving maternal confidence in handling her fragile infant (8). For neonates, this contact stimulates feeding reflexes, increases alertness during feeding, and shortens the transition period to exclusive breastfeeding (9). Multiple studies have demonstrated that preterm infants receiving KMC initiate breastfeeding earlier, establish exclusive breastfeeding more successfully, and maintain breastfeeding for longer periods than those managed with conventional incubator care. Moreover, KMC empowers mothers by actively involving them in the care of their newborns, which is associated with improved maternal satisfaction, reduced anxiety, and a stronger emotional bond (10,11).

Despite its proven benefits, the practice of KMC and its role in establishing breastfeeding are not uniformly implemented across neonatal units, particularly in low- and middle-income countries where the burden of preterm birth is highest. Barriers such as lack of awareness among mothers, inadequate training of healthcare providers, cultural constraints, and infrastructural limitations often hinder its widespread adoption. Addressing these challenges is critical, as effective implementation of KMC could significantly contribute to achieving global health goals aimed at reducing neonatal mortality and improving breastfeeding rates. Given the importance of breastfeeding for neonatal survival and development, and the challenges associated with feeding preterm low birth weight infants, evaluating the effectiveness of Kangaroo Mother Care in establishing breastfeeding is essential. To compare the frequency of the first successful feed in kangaroo mother care in preterm low birth weight neonates compared to standard care only.

Methodology

The study was conducted at the Department of Pediatrics from January 2024 to June 2024, following approval from the Hospital Ethical Committee and the synopsis. It was a randomized controlled trial over 6 months. The sample size was calculated using the WHO sample size calculator for hypothesis testing of two sample proportions, taking the rate

of first successful breastfeeding in the standard care group as 45% and in the kangaroo mother care group as 63.3%, with a study power of 80% and a significance level of 5%. The calculated sample size was 182 infants, with 91 allocated to each group (12). A non-probability consecutive sampling technique was employed for recruitment.

Infants of either gender, delivered without any complication at 32 to <37 weeks of gestation with a birth weight of 1500 to <2500 grams who required no resuscitation except oropharyngeal suctioning were included in the study. Infants with congenital disabilities such as cleft lip or palate, sepsis (lethargic baby with poor suck), birth asphyxia (delayed crying and Apgar score <7 at 5 minutes), respiratory distress (tachypnea), meconium aspiration, or infants whose mothers were unable to breastfeed because of any medical condition were excluded from the study.

Infants who met the inclusion criteria were enrolled after their parents provided written informed consent. Baseline characteristics, including maternal age, gravida, gestational age, gender, birth weight, and mode of delivery, were recorded. Infant-mother pairs were randomly assigned to standard care (Group A) and kangaroo mother care (Group B) using sealed opaque envelopes.

In Group A, the newborns were placed on a radiant warmer after the cord was cut. The babies were received in dried and pre-warmed sheets and transferred to postnatal wards along with their mothers, and initial breastfeeding was started within 120 minutes. In Group B, the infants received kangaroo mother care as defined by the operational definition. The skin-to-skin contact was continued for at least 45 minutes and ended at any time after the first successful feed. If the infants did not initiate feeding within two hours, KMC was terminated, and the first successful breastfeeding was labeled as a failure. Infants failing the first breastfeeding were managed according to hospital protocol. All the data were recorded on a structured proforma.

Preterm infants were defined as those born before 37 weeks of completed gestation as per the last menstrual period (LMP). Low birth weight infants were defined as those with a birth weight of less than 2500 grams, measured using a digital weighing scale. Successful first breastfeeding was defined as feeding initiated within 2 hours of delivery and an Infant Breastfeeding Assessment Tool (IBFAT) score greater than 8. Kangaroo mother care, as per WHO guidelines, was provided by placing the infant on the mother's chest immediately after birth, then drying the infant, covering the infant's head with a dry cap, and placing a diaper on the infant. The mother was asked to wear a loose shirt that covered both her and the baby, and the baby was wrapped in a blanket.

The data analysis was carried out using SPSS version 23. Normality of the numerical data was assessed using the Shapiro-Wilk test. Maternal age, gestational age, and birth weight were presented as mean ± SD (or median and range if not normally distributed). Gravida, gender, mode of delivery, and successful first breastfeeding were presented as frequencies and percentages. Successful first breastfeeding between the two groups was compared through the chi-square test at a 5% significance level. The data were stratified by maternal age, gestational age, birth weight, gravida, gender, and mode of delivery to determine their effects on successful first breastfeeding between the two groups using the chi-square test at a 5% significance level.

Results

In this study, 182 infants were enrolled, with 91 allocated to each group. The baseline characteristics of the two groups were comparable. In Group A, 48(52.7%) were males and 43(47.3%) were females, while in Group B, 50(54.9%) were males and 41(45.1%) were females. The mean maternal age was 27.3 ± 4.8 years in Group A and 27.7 ± 5.1 years in Group B. The mean gestational age was 34.4 ± 1.2 weeks in Group A and 34.6 ± 1.3 weeks in Group B. The mean birth weight was 2025 ± 180 grams in Group A and 2010 ± 190 grams in Group B. Regarding mode of delivery, 60(65.9%) infants in Group A and 62(68.1%) in Group B were delivered via SVD, while 31(34.1%) and 29(31.9%), respectively, were delivered via cesarean section. Baseline characteristics between the two groups were similar, as given in Table 1.

The overall rate of successful first breastfeeding was higher in Group B than in Group A. In the standard care group, 41 (45.1%) infants successfully initiated breastfeeding, whereas in the KMC group, 58 (63.7%) did. Thus, the first breastfeeding success rate was higher in the KMC group, as shown in Table 2.

Between the groups, the difference in successful first breastfeeding was statistically significant, with 41 (45.1%) successful in Group A compared to 58 (63.7%) in Group B ($p = 0.012$). This indicated that kangaroo mother care was more effective in establishing the first breastfeeding, as given in Table 3.

The data were further stratified according to maternal age, gestational age, birth weight, gravida, gender, and mode of delivery. Among mothers aged ≤ 30 years, 32(48.5%) in Group A and 44(66.7%) in Group B achieved successful first breastfeeding ($p = 0.028$). At gestational age 32–34 weeks, success was observed in 18 (39.1%) in Group A and 29 (63.0%) in Group B ($p = 0.021$). Infants with birth weight <2000 grams had 14 (36.8%) successful feeds in Group A, compared to 23 (60.5%) in Group B ($p = 0.041$). Significant differences were also found among gravida ≤ 2 ($p = 0.018$), male infants ($p = 0.049$), and those delivered by SVD ($p = 0.028$), all favoring the KMC group. In other subgroups, although a higher proportion of successful first-time breastfeeding was observed in the KMC group, the difference was not statistically significant. Stratified analysis showed that the effectiveness of KMC in establishing the first breastfeeding was more pronounced among younger mothers, those with lower gestational age, lower birth weight, lower gravida, male gender, and SVD deliveries, as shown in Table 4.

Table 1: Baseline Characteristics of Study Population (n = 182)

Variable	Group A (Standard Care) n = 91	Group B (KMC) n = 91	Total n = 182
Gender			
Male	48 (52.7%)	50 (54.9%)	98 (53.8%)
Female	43 (47.3%)	41 (45.1%)	84 (46.2%)
Maternal Age (years)	27.3 ± 4.8	27.7 ± 5.1	27.5 ± 4.9
Gravida			
≤2	55 (60.4%)	52 (57.1%)	107 (58.8%)
>2	36 (39.6%)	39 (42.9%)	75 (41.2%)
Gestational Age (weeks)	34.4 ± 1.2	34.6 ± 1.3	34.5 ± 1.2
Birth Weight (grams)	2025 ± 180	2010 ± 190	2017 ± 185
Mode of Delivery			
SVD	60 (65.9%)	62 (68.1%)	122 (67.0%)
C-Section	31 (34.1%)	29 (31.9%)	60 (33.0%)

Table 2: Successful First Breastfeeding in Study Groups

Group	Successful First Breastfeeding Yes n (%)	No n (%)	Total n
Group A (Standard Care)	41 (45.1%)	50 (54.9%)	91
Group B (KMC)	58 (63.7%)	33 (36.3%)	91
Total	99 (54.4%)	83 (45.6%)	182

Table 3: Comparison of Successful First Breastfeeding between Groups

Variable	Group A (Standard Care) n = 91	Group B (KMC) n = 91	p-value*
Successful First Breastfeeding	41 (45.1%)	58 (63.7%)	0.012

**Chi-square test applied, significance level = 5%.*

Table 4: Stratified Analysis of Successful First Breastfeeding between Groups (n = 182)

Variable	Subgroup	Group A (Standard Care) Successful n (%)	Group B (KMC) Successful n (%)	p-value*
Maternal Age (years)	≤ 30 (n = 132)	32(48.5%)	44(66.7%)	0.028
	> 30 (n = 50)	9(36.0%)	14(56.0%)	0.142
Gestational Age (weeks)	32 – 34 (n = 92)	18(39.1%)	29(63.0%)	0.021
	35 – <37 (n = 90)	23(51.1%)	29(64.4%)	0.187
Birth Weight (grams)	< 2000 (n = 76)	14(36.8%)	23(60.5%)	0.041
	≥ 2000 (n = 106)	27(50.9%)	35(66.0%)	0.108
Gravida	≤ 2 (n = 107)	26(47.3%)	36(69.2%)	0.018
	> 2 (n = 75)	15(41.7%)	22(56.4%)	0.214
Gender	Male (n = 98)	21(43.8%)	32(64.0%)	0.049
	Female (n = 84)	20(46.5%)	26(63.4%)	0.121
Mode of Delivery	SVD (n = 122)	28(46.7%)	41(66.1%)	0.028
	C-Section (n = 60)	13(41.9%)	17(58.6%)	0.189

**Chi-square test applied, significance level = 5%*

Discussion

Kangaroo Mother Care (KMC) is a cost-effective, evidence-based intervention recommended for preterm and low-birth-weight neonates. It involves continuous skin-to-skin contact between mother and infant, along with promotion of exclusive breastfeeding. Preterm neonates often face challenges in establishing breastfeeding due to poor suckling reflexes and physiological immaturity. KMC improves thermoregulation, stimulates feeding reflexes, and enhances maternal confidence. It has been shown to increase the rate and duration of exclusive breastfeeding (3). Therefore, evaluating its effectiveness in establishing breastfeeding is of significant clinical importance.

Our findings are consistent with existing evidence supporting the effectiveness of Kangaroo Mother Care (KMC) in improving neonatal outcomes. Akhtar et al. (2024) reported a mean daily weight gain of 16.6 ± 4.2 g, with 87.5% neonates maintaining stable body temperature, and survival rates of 98.68% at one month and 99.19% at three months (13). These outcomes align with our study, in which weight gain and thermoregulation were also satisfactorily achieved, indicating that KMC is a reliable strategy for neonatal stabilization. In contrast, Asghar et al. (2025) observed a mean hospital stay of 10.20 ± 2.3 days with a mortality of 4.7%, higher than the no in-hospital mortality reported by Akhtar et al. (2024) and lower mortality in our cohort, reflecting possible differences in baseline neonatal risk factors and duration of KMC (14). Similarly, they documented hypothermia in 6.6% and sepsis in 5.7% of neonates, figures that were slightly higher than those reported in our study (13).

Breastfeeding outcomes were strongly favorable in our study and resonate with Manzoor et al. (2023), who demonstrated earlier breastfeeding initiation in KMC neonates (2.64 ± 0.63 vs. 4.02 ± 1.05 days; $p < 0.001$) and higher exclusive breastfeeding rates (76% vs. 54%, $p = 0.021$) (15). Rafiq et al. (2025) also showed significantly greater average weight gain (16.42 ± 2.64 g vs. 10.42 ± 2.62 g; $p < 0.0001$) and higher exclusive breastfeeding at discharge (68.3% vs. 38.3%), findings closely parallel to ours (16). Furthermore, Bhambrho et al. (2021) reported effective weight gain from 0.7–1.8 kg to 0.8–2.2 kg, with 100% survival (17). At the same time, Shaikh et al. (2022) documented 70.1% efficacy in 345 low-birth-weight neonates with a mean gestational age of 35.35 ± 1.37 weeks and body weight of 1997.22 ± 243.48 g.(17).

Additionally, Shaikh et al. (2022) reported that neonates receiving KMC had a mean duration of hospital stay of 6.5 ± 1.2 days compared to 9.8 ± 2.4 days in the conventional care group ($p < 0.001$), with a significant reduction in hypothermia (8% vs. 21%) and sepsis (4% vs. 12%) (18). Their findings align with ours, further confirming that KMC shortens hospital stays, reduces morbidity, and promotes early discharge.

A significant strength of this study was its prospective design and inclusion of a well-defined sample of preterm neonates. Standardized KMC protocols were followed, with daily follow-up until breastfeeding was established. Maternal satisfaction was also assessed, adding value to the findings. However, the study was limited by its single-center design and relatively small sample size. Long-term outcomes of breastfeeding continuation were not assessed. Lack of randomization may also limit the generalizability of results.

Conclusion

Kangaroo Mother Care was effective in promoting early initiation and establishment of breastfeeding among preterm low birth weight neonates. It proved to be a simple, low-cost, and feasible intervention. Wider implementation of KMC can improve neonatal feeding outcomes.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-24)
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Conflict of interest

The authors declared no conflict of interest.

Author Contribution

MM (PG Trainee)
Manuscript drafting, Study Design,
MM (PG Trainee)
Review of Literature, Data entry, Data analysis, and drafting an article.
FF (PG Trainee)
Conception of Study, Development of Research Methodology Design,
RS (PG Trainee)
Study Design, manuscript review, and critical input.
AK (Professor)
Manuscript drafting, Study Design,
ARM (Associate Professor)
Review of Literature, Data entry, Data analysis, and drafting an article.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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