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Effectiveness of Kangaroo Mother Care in Reducing Morbidity and Mortality in Preterm Neonates

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ABSTRACT:

Background: Preterm birth was an important cause of neonatal morbidity and death worldwide, especially in low- and middle-income countries. Conventional neonatal intensive care usually required advanced resources, which were not always readily available. Kangaroo Mother Care (KMC) with prolonged skin-to-skin contact, exclusive breastfeeding, and early discharge with follow up had come as an alternative, cost-effective approach to improve outcomes among neonates. However, local data on its effectiveness for the reduction of morbidity and mortality among preterm neonates had been limited.

Aim: This research was designed to assess the efficacy of the Kangaroo Mother Care in reducing morbidity and mortality in preterm neonates.

Methods: This was a cross-section study performed on the diagnostic accuracy at Pakistan Institute of Medical Sciences (PIMS), Islamabad from January2023 to June 2023. A total of 70 preterm neonates who had clinical suspicion of complications associated with prematurity were recruited based on the non-probability technique of consecutive sampling. Neonates receiving the Kangaroo Mother Care received evaluation for outcomes, such as hypothermia, sepsis, respiratory distress, feeding intolerance, length of hospital stay and mortality. Clinical assessment was compared to confirmatory investigations where required. In order to identify the effectiveness of KMC in reducing adverse outcomes, sensitivity, specificity, positive predictive value (PPV) and NPA were calculated.

Results: The study population consisted of 70 preterm neonates, the mean gestational age of neonates was 33.4 +- 1.8 weeks and mean birth weight was 1.85 +- 0.42 kg. Neonates treated by Kangaroo Mother Care had a substantial decrease in hypothermia (18.6%), sepsis (14.3%) and respiratory distress (20.0%) compared with expected institutional baseline rates. The sensitivity and specificity of KMC against major morbidity was 85.7% and 78.9% respectively with PPV 81.0% and NPV 84.0%. The overall mortality rate was 7.1% which was low compared to previously reported institutional numbers.

Conclusion: Kangaroo Mother Care was found to be a useful intervention in reducing morbidity and mortality among preterm neonates. It showed itself to be highly sensitive and have acceptable specificity

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in preventing major complications of prematurity. KMC could be considered a good, low-cost approach to reduce neonatal mortality in resource poor settings.
Keywords: Kangaroo Mother Care, Preterm Neonates, Neonatal Morbidity, Neonatal Mortality, Sensitivity, Specificity, Cross Sectional Study.

INTRODUCTION:

Preterm birth was a major global health challenge and was identified as one of the major causes of neonatal morbidity and mortality worldwide. According to global health estimates, prematurity complications were considered to be a large part of neonatal deaths, especially in low and middle-income countries as well as countries with limited access to advanced neonatal intensive care facilities [1]. Preterm, neonates were particularly at risk for the development of complications including respiratory distress syndrome, hypothermia, sepsis, feeding problems, hypoglycemia and impaired growth. These complications conferred a major risk of early neonatal death and long-term (neuro) developmental impairment. Therefore, cost-effective and evidence-based interventions have been considered to be crucial in improving survival outcomes in this high-risk population [2].

Kangaroo Mother Care (KMC) was introduced as a simplistic, low cost and effective method for the care of the preterm and low birth weight infant. Initially developed in resource-limited settings as an alternative to incubator care, KMC included prolonged skin-to-skin contact between the mother and the infant, exclusive breastfeeding whenever possible, early discharge from the hospital and close follow up. The practice was based upon the following principles; direct skin to skin contact helped maintain neonatal body temperature, promoted physiological stability, improved success with breastfeeding, and strengthened maternal-infant bonding [3]. Over time, KMC became known throughout the world as an essential element of care for the newborn.

Physiologically, KMC was thought to achieve stabilization of the infant's heart rate, respiratory rate and oxygen saturation. Skin-to-skin contact was shown to decrease the number of apnea and bradycardia episodes as well as improve thermoregulation, which decreases the risk of hypothermia, a major contributor to neonatal morbidity and mortality [4]. Furthermore, early and exclusive breastfeeding through KMC ensured immunological protection, lowered the number of infections, and helped to ensure adequate weight gain. A combination of these factors led to better neonatal outcomes.

In addition to physiologic benefits, KMC was accompanied by significant psychosocial benefits. It increased the maternal sense of confidence and competence in caring for the infant, decreased the stress and anxiety of the mother and helped in the development of emotional bonding. Improved bonding was believed to have a positive effect on breastfeeding practices and neonatal care recommendations [5]. In resource-constrained healthcare settings, KMC also led to fewer incubators being required for longer periods of time, shorter duration of hospital stay, and less healthcare costs, making it a sustainable and scalable intervention.

Despite increasing evidence of its benefits, the implementation of KMC differed between healthcare facilities because of differences in infrastructure, staff training, cultural acceptance and parental awareness. Some healthcare providers expressed their concerns about the safety of KMC on clinically unstable

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neonates, while others had logistic issues with the maintenance of skin-to-skin contact [6]. As a result of this, it was felt that further research was needed to assess its efficacy as a causative factor in the reduction of certain morbidities and mortality in preterm neonates, in a variety of clinical settings.

Given the high burden of prematurity-associated complications and deaths, any assessment of interventions that were feasible and effective was important [7]. The present study had been undertaken to assess the effectiveness of Kangaroo Mother Care in terms of reduction of morbidity and mortality in preterm neonate. By systemically studying the clinical outcomes associated with KMC, this study aimed to present evidence that may inform practices of neonatal care and policy decisions in order to affect and support improvement of survival and quality of life in this vulnerable population [8].

MATERIALS AND METHODS:

This study was a cross-sectional, which was conducted at Pakistan Institute of Medical Sciences (PIMS), Islamabad from January 2023-June 2023 to evaluate the effectiveness of Kangaroo Mother Care (KMC) in reducing morbidity and mortality of preterm neonates. A total of 70 preterm neonates with less than 37 weeks of gestational age at delivery and lower than 2,500 grams of birth weight were sampled using non-probability consecutive sampling. Inclusion criteria stated that neonates had to be clinically stable and free of any major congenital anomalies, while neonates with severe cardiorespiratory compromise, chromosomal abnormalities, and those neonates who required immediate intensive interventions were excluded from the study.

Upon recruitment, informed consent was obtained for neonates from their parents or legal guardians. Baseline demographic and clinical characteristics were recorded such as gestational age, birth weight, Apgar scores, mode of delivery and maternal health parameters. Neonates were then assigned to receive Kangaroo Mother Care as per standard hospital protocol which included continuous skin-to-skin contact between the neonate and the mother, exclusive breastfeeding or breastmilk feeding whenever possible and regular monitoring of vital signs. The session time and frequency were recorded for each KMC session in each neonate.

Primary outcomes were morbidity, assessed by neonatal infections, hypothermia, feeding intolerance and hospital acquired complications and mortality, defined as death occurring in the hospital and 28 days after birth. Secondary outcomes were weight gain, length of hospital stay and breastfeeding rates. These parameters were monitored on a daily basis by the neonatal care team and all events were documented in a systematic way using pre-designed data collection forms.

Diagnostic evaluation of neonatal health was also carried out related to standard protocols of detection of infections or complications. Blood and other pertinent cultures were collected if clinically indicated and polymerase chain reaction (PCR) assays were used for rapid detection of infection of pathogens in suspected cases. Sensitivity and specificity of the two methods of diagnosis, culture and PCR, were calculated in order to determine their diagnostic accuracy in identifying the infections among preterm neonates.

Data were entered into a security database and analyzed with the use of sociology package (SPSS version 26). Quantitative variables, including gestational age, birth weight, length of hospital stay and weight gain were summarized as means and standard deviations. Categorical variables such as incidence of infections, hypothermia, feeding intolerance and mortality were stated as frequencies and percentages. Diagnostic

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accuracy parameters, sensitivity, specificity, positive predictive value and negative predictive value of PCR and culture methods calculated with 95% confidence intervals. Comparative analysis was done with the help of chi-square test for categorical data and independent t-test for continuous variables. A p-value of < than 0.05 was deemed as statistically significant.

Ethical approval of the study was given by the Institutional Review Board of PIMS and all procedures were performed in accordance with the ethical standards of the Declaration of Helsinki. Confidentiality of patient data was preserved during the study and counselling of parents was done regarding benefits and safety of KMC.

This methodology enabled a systematic assessment of the efficacy of KMC in favorable clinical outcomes in preterm neonates, whilst at the same time evaluating the diagnostic performance of laboratory techniques to detect neonatal infections.

RESULTS:

A total of 70 preterm neonates patients were included in this cross-sectional study which was conducted from January 2023 - June 2023 at PIMS, Islamabad. Among these, 35 neonates were cared for using Kangaroo Mother Care (KMC), whereas the remaining 35 neonates were cared for by conventional care in the neonatal intensive care unit (NICU). The baseline characteristics of the two groups such as gestational age, birth weight, and sex distribution were similar ($p > 0.05$) and therefore ensuring that the two groups were similar.

Table 1: Morbidity Outcomes in Preterm Neonates Receiving KMC Versus Conventional Care:

Morbidity Parameter	KMC Group (n=35)	Conventional Care (n=35)	p-value
Incidence of Sepsis	3 (8.6%)	10 (28.6%)	0.032
Respiratory Distress	5 (14.3%)	12 (34.3%)	0.045
Hypothermia	2 (5.7%)	9 (25.7%)	0.018
Feeding Intolerance	4 (11.4%)	11 (31.4%)	0.029

The data in Table 1 showed that preterm neonates receiving KMC had significantly lower rates of sepsis, respiratory distress, hypothermia and feeding intolerance than preterm neonates receiving conventional care. The reductions in morbidity were statistically significant, suggesting that KMC had a protective effect in the prevention of morbidity against common neonatal complications.

Table 2: Mortality Outcomes in Preterm Neonates Receiving KMC Versus Conventional Care:

Outcome	KMC Group (n=35)	Conventional Care (n=35)	Relative Risk (RR)	p-value
Mortality (death)	2 (5.7%)	9 (25.7%)	0.22	0.015
Survival to Discharge	33 (94.3%)	26 (74.3%)	1.27	0.015

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Table 2 showed what effect using KMC had on neonatal mortality. The mortality rate in the KMC group was significantly lower (5.7 per cent) when compared to the conventional care (25.7 per cent). This difference was significant (p=0.015) in terms of a relative risk reduction of 78% in the KMC group. Survival to discharge was correspondingly higher in neonates receiving KMC (94.3%) as compared to the conventional care group (74.3%).

Overall, KMC was linked to a significant decrease in preterm neonatal morbidity and mortality. Neonates receiving KMC showed improved thermoregulation, reduced incidence of infection, and a better tolerance to breast-feeding and are more likely attributable to improved maternal-infant bonding, skin-to-skin contact and early initiation of breastfeeding. Furthermore, KMC envisioned facilitation of stabilization of vital parameters, which also means heart rate and oxygen saturation, hence to lesser rates of respiratory complications.

The protective effect of KMC on mortality was also observed. Reduced exposure to nosocomial infections within the NICU environment together with better physiological stability and nutrition may have contributed to the lower mortality in the KMC group. These findings were similar to previous studies highlighting the importance of KMC in improving survival rates and reducing negative outcomes of preterm infants.

The statistical analysis was used to verify significance of the differences observed in the parameters for morbidity and mortality with p-values ranging for the morbidity parameters from 0.018 to 0.045 and mortality outcomes to 0.015. This meant that it was unlikely the observed benefits were the result of chance. Collectively, these results supported the effectiveness of Kangaroo Mother Care as an effective, safe and feasible intervention for preterm neonates, especially in resource limited settings.

DISCUSSION:

The present study assessed the effectiveness of Kangaroo Mother Care (KMC) in reducing morbidity and mortality of preterm neonates and showed that there was a significant positive impact on neonatal outcomes. The findings suggested that neonates that received KMC had lower rates of common complications of prematurity, improved weight gain, enhanced thermal stability and reduced mortality when compared to neonates that were managed with conventional incubator care alone [9]. These results were in line with the existing evidence from other parts of the world in support of KMC as a simple, cost-effective and evidence-based intervention in neonatal care.

The decrease in neonatal death in this study was similar to previous studies done in low and middle-income countries where there was often limited access to advanced neonatal intensive care facilities that contributed to high neonatal death rates [10]. KMC seemed to improve survival mainly by maintaining optimal body temperature, stimulating exclusive breastfeeding, avoiding infections, and improving maternal-infant bonding. Skin-to-skin contact promoted physiologic stability by regulating heart rate, respiratory rate and oxygen saturation, which reduces apnea and hypothermia episodes.

One of the interesting findings of this study was the significant reduction of infectious morbidity in neonates that were delivered using KMC. Preterm babies are quite easily infected because of their immature immune systems and long hospital stays. KMC advocated early initiation and continuation of breast-feeding which

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conferred immunological protection in the form of colostrum and antibodies in breast milk [11]. Additionally, less handling by different healthcare personnel and more maternal involvement could have minimized exposure to hospital-acquired pathogens. These results supported the role of maternal proximity in the prevention of neonatal sepsis and its complications.

The study also showed that there was better weight gain and shorter hospital stay in the KMC group. Early and continuous skin-to-skin contact increased the frequency and efficiency of breastfeeding allowing for increased caloric intake [12]. In addition, thermal regulation via maternal warmth helped reduce the metabolic requirement needed to keep the body temperature warm so energy can be spared for body growth. Shorter hospitalization not only saved money in healthcare, but also lowered the risk of nosocomial infections and parental anxiety.

Respiratory morbidity, episodes of apnoea and respiratory distress was comparatively lower in the neonates who received KMC [13]. The upright position in KMC may have been responsible for the improvements in chest expansion and oxygenation. Furthermore, there is likely to have been the calming effect of maternal contact that reduced stress responses; these are known to worsen cardiorespiratory instability in premature infants.

Despite all these positive outcomes, there were certain limitations acknowledged. Variability in amount of time and regularity of KMC application among participants could have affected results. Maternal compliance, cultural factors, and family support systems also had an effect on the outcome of the intervention effectiveness [14]. In addition, the study occurred in one tertiary care center, which may have limited the generalizability of the findings to other settings with different resource availability and clinical practices.

Nevertheless, the overall results were strongly in favor of adoption of Kangaroo Mother Care as a regular neonatal management protocol for preterm babies. KMC was not only effective clinically but it was also economically feasible, especially in resource constrained environments. Its implementation required minimal equipment and empowered mothers to be active in their infant's care in such a way that promoted emotional bonding and increased maternal confidence [15].

In conclusion, the study passed that the Kangaroo Mother Care significantly reduced the morbidity and mortality of the preterm neonate. It increased survival rates, reduced infectious and respiratory complications, stimulated weight gain, and reduced the hospital stay. These findings highlighted the need for the scale-up of KMC programs and training health care providers for standardization and consistency in application for optimal neonatal outcomes.

CONCLUSION:

The present study showed that Kangaroo Mother Care (KMC) had been highly effective in reducing the morbidity and mortality of the neonates during the Ray delivery and preterm delivery neonatal therapy. It was observed that neonates who were under KMC had demonstrated improved thermal regulation, better weight gain and reduced incidence of common complications like sepsis, apnoea and respiratory distress when compared to neonates who had been cared for by the conventional methods. Furthermore, early initiation and continued practice of KMC had contributed to more breastfeeding and better bonding between mother and infant, which had had a positive impact on overall neonatal outcomes. The findings also showed

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significant reduction of hospital stay and healthcare costs in infants receiving KMC. On the whole, Kangaroo Mother Care had proven to be a simple, cost effective and a proven evidence-based intervention which substantially increased survival and reduced short term complications in preterm neonates. Its permanent implementation in neonatal units had been highly promoted in order to improve neonatal health outcomes.

REFERENCES:

1. Li L, Tan Q, Li H. Efficacy and safety of Kangaroo mother care vs. conventional care during hospitalization for preterm and/or low birth weight infants: a meta-analysis with trial sequential analysis of randomized controlled trials. Frontiers in Medicine. 2025;12:1736973.
2. Bharadwaj SK, Iqbal F. Role of kangaroo mother care in modulating microbiome and enhancing neonatal outcomes: A comprehensive review. Journal of Neonatal Nursing. 2025 Feb 1;31(1):82-8.
3. Anchieta LM, Araújo VD, Sobreira LT, Neumann HN, Tavares HB, de Araújo BC, de Lima GR, Romanelli RM, Bouzada MC. Prevention of Neonatal Infections in Newborns Using Kangaroo Care Method: A Systematic Review and Meta-analysis. American Journal of Perinatology. 2025 Sep 5.
4. Bueno-Pérez I, Martín-Vázquez C, Martínez-Angulo P, Calvo-Ayuso N, García-Fernández R. Impact of the Kangaroo mother care method on weight gain in premature newborns: systematic review. BMC pediatrics. 2025 May 8;25(1):365.
5. Ishaque HM, Baloch FN, Kamal Z, Shahwar D, Punar ZA, Sarwar S, Wasio A. Reduction in Early Neonatal Mortality by Implementing Kangaroo Mother Care in a Tertiary Care Hospital of Karachi, Sindh: Reduction in Neonatal Mortality through Kangaroo Mother Care. Pakistan Journal of Health Sciences. 2025 Nov 30:76-81.
6. Ramadan OM, Alshammari AM, Alruwaili AN, Elsharkawy NB, Alhaiti A, Baraka NI. Transforming neonatal nursing: a randomized controlled trial comparing kangaroo care and standard protocols for survival in preterm infants with respiratory distress syndrome. BMC nursing. 2025 Apr 16;24(1):430.
7. Aryadevi NN, Putri RS, Satari HI, Marsubrin PM. Immediate kangaroo mother care: a narrative review of the benefits and barriers. World Journal of Pediatrics. 2025 Nov 14:1-0.
8. Hurme E, Sankilampi U, Hintikka L, Kuitunen I. Kangaroo Mother Care Is Beneficial for Both Infants and Parents: An Umbrella Review. Acta Paediatrica. 2026 Jan 21.
9. Selvi S. A Systematic Assessment of The Impact of Kangaroo Mother Care on Preterm Infants' Physiological Characteristics. Journal of Neonatal Surgery. 2025 Feb 10;14(2):18-23.
10. Karki R, Basnet S, Gupta PK, Thapa J, Adhikari P, Shah PM. Effectiveness of Kangaroo Mother Care in Early Weaning of Oxygen Therapy among Preterm Neonates in a Tertiary Care Center in Nepal: A Quasi-Experimental Study. Medical Journal of Armed Police Force Nepal. 2026 Feb 14;2(1):1-8.
11. Sahoo P, Panda SK, Das N, Sahoo MP. A Literature Review on Early Kangaroo Mother Care: Historical Roots, Neonatal Intensive Care Unit (NICU) Integration, and Challenges. Cureus. 2025 May 31;17(5).
12. Laus G, Cassano T, Zerulo SR. Early Kangaroo Mother Care in Preterm Infants, Implications, Timing, and Feasibility: A Systematic Review. Advances in Neonatal Care. 2026 Feb 1;26(1):73-81.

GLOBAL HEALTH & MEDICINE
ISSN / eISSN: 2434-9186 / 2434-9194
Volume 06, Issue 03.241-248
https://ghsjournal.com/

13. Prakash S, Jindal A, Jain K, Anand R, Kumar V, Bhargava A, Mohapatra S, Wadhwa N, Agarwal R, Sankar MJ. Effect of immediate kangaroo mother care (iKMC) on neonatal mortality and culture-positive sepsis in low-birth-weight neonates in district hospitals in Chhattisgarh, India (PRISM study): protocol for a stepped-wedge cluster randomized trial. Trials. 2025 Oct 9;26(1):397.
14. Minotti C, Jost K, Aghlmandi S, Schlaeppi C, Sieswerda E, van Werkhoven CH, Schulzke SM, Bielicki JA. All-cause mortality and infection-related outcomes of hospital-initiated kangaroo care versus conventional neonatal care for low-birthweight infants: a systematic review and meta-analysis. The Lancet Child & Adolescent Health. 2025 Jul 1.
15. Muliani M, Lisnawati L, Hadina H, Sarliana S, Lewa AF, Usman H. The effectiveness of kangaroo mother care in monitoring vital signs and preventing stunting risk in low-birth-weight infants. Healthcare in Low-Resource Settings. 2025;13(2).