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Reduction in Early Neonatal Mortality by Implementing Kangaroo Mother Care in a Tertiary Care Hospital of Karachi, Sindh

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ABSTRACT

Sub-optimal weight, as a result of prematurity or restricted growth affects 15% newborns globally, and eventually contributes in up to 70% of neonatal deaths. In November 2015, the World Health Organization (WHO) officially recommended Kangaroo Mother Care (KMC) for newborns with a birth weight of less than 2 kg. **Objectives:** To evaluate the impact of Kangaroo Mother Care (KMC) on early neonatal death rate among preterm and low-birth-weight infants. **Methods:** This descriptive cross-sectional analysis was carried out over the period of six months, from July 2021 to January 2022. All the patients visiting Tertiary Care Hospital of Karachi, Sindh, who met the inclusion criteria were enrolled in this study. Informed consent was taken after explaining the procedures, potential risks, and anticipated benefits of the study. The three key elements of Kangaroo Mother Care were explained which included direct skin contact, breastmilk feeding exclusively, and expedited hospital discharge, with a demonstration of the proper technique for keeping infants on the mother's chest, and using a sheet for wrapping around the baby and the mother. For research purposes, all data were recorded in a proforma and used electronically. **Results:** Mean ± SD of age of mother was 26.99±4.3 years. In the distribution of the gender of the baby, 121 (57.6%) were male, while 89 (42.4%) were female. Kangaroo-mother care in reducing early neonatal fatalities was noted as effective in 60 (28.6%) participants. **Conclusions:** In conclusion, Kangaroo Mother Care was successful in lowering early neonatal fatalities.

INTRODUCTION

Preterm birth, occurring at less than 37 weeks of pregnancy, represents a significant public health issue, affecting nearly 10% of newborns worldwide. It represents the primary contributor to infant death and illness, and is linked with a heightened risk of respiratory distress syndrome, cerebral palsy, and developmental impairment [1, 2]. As described in a report issued by the World Health Organization in 2019, the highest risk of death is faced by newborns in their first month of life due to prematurity, with the highest numbers in the first week of life [3]. Pakistan ranks third among the ten most prominent nations having the greatest infant mortality rates, with roughly 300,000

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annual infant deaths. The latest available data reports an incidence of neonatal mortality of 42 per 1,000 live births, corresponding to nearly 7% of worldwide newborn fatality [4]. As defined by the World Health Organization (WHO), low birth weight (LBW) is a birth weight of less than 2,500 grams, irrespective of the duration of pregnancy [5]. It is a major concern that impacts more than 30 million infants globally. [6] Research conducted across Guinea-Bissau, Nepal, Pakistan, and Uganda demonstrated that poor infant growth is widespread in low- and middle-income countries (LMIC) and contributes to higher risks of cognitive and immune deficiencies, as well as increased vulnerability to infections [7]. According to a report updated by the World Development Indicators in December 2019, there were 42 neonatal deaths per 1,000 live births in Pakistan in 2018, with the majority of these fatalities resulting from preventable causes. [8]. Worldwide, various preventive measures and care packages are designed to minimize the effects of preterm delivery after the onset of labor and during the early infancy; however, some are not suitable for every setting. The International Journal of Gynecology & Obstetrics (IJOG) recently endorsed the FIGO PremPrep-5 initiative, designed to share essential date on the most straightforward and validated approaches to promote worldwide adoption. It entails providing corticosteroid therapy during pregnancy and magnesium sulfate during labor before delivery. Deferring the clamping of the umbilical cord for 2–3 minutes at birth is advised. After birth, prompt breastfeeding and immediate kangaroo care are advised. [9] Compared with standard NICU care, Kangaroo Mother Care (KMC) was linked with a decline in several risks: hospital acquired infection at 41 weeks' corrected gestational age (RR 0.49, 95% CI 0.25–0.93), serious illness (RR 0.30, 95% CI 0.14–0.67), lower respiratory tract conditions at six months follow-up (RR 0.37, 95% CI 0.15–0.89), lack of exclusive breastmilk feeding at hospital discharge (RR 0.41, 95% CI 0.25–0.68), and maternal dissatisfaction with care (RR 0.41, 95% CI 0.22–0.75). Additionally, infants receiving KMC demonstrated greater daily weight gain by the time of discharge (WMD 3.6 g/day, 95% CI 0.8–6.4) [10, 11]. Civil Hospital Karachi is among the largest and most prominent tertiary care hospitals in Pakistan, but its neonatal intensive care units and incubators are always overcrowded due to resource limitations. Therefore, in this study, all stable premature and underweight infants will be provided with Kangaroo Mother Care as a substitute for traditional care. This approach is expected to be cost-effective and reduce neonatal mortality resulting from preterm birth complications. The present study evaluates the impact of Kangaroo Mother Care (KMC) on early neonatal mortality among preterm and low-birth-weight infants in a tertiary care hospital in Karachi, Sindh.

This study aimed to contribute valuable insights to enhance neonatal outcomes in this at-risk population by assessing the efficacy of the Kangaroo Mother Care approach.

METHODS

This cross-sectional descriptive study was carried out in the Gynecology and Obstetrics Unit at Dr. Ruth K.M. Pfau Civil Hospital, Karachi, over six months from July 2021 to January 2022. Ethical approval was obtained from the research evaluation unit CPSP (Ref. No. CPSP/REU/OBG-2018-183-8765). Data collection involved enrolling eligible patients who were willing to participate in the study and were kept as inpatients. No additional intervention was introduced for research purposes, and all enrolled neonates received standard care as per hospital protocols. The number of participants was estimated using OpenEpi version 3.01 software. The calculation was based on the formula for estimating a single population proportion: $n=Z^2 x\ p\ x\ (1-p)\ /\ d^2$ Where n is the required sample size, Z is the standard normal deviate corresponding to the desired confidence interval (1.96 for 95% confidence interval), p is the estimated proportion of the population with the characteristics of interest (36% reduction in early neonatal mortality), and d is the margin of error (6.5%). Substituting these values yielded a sample size of 210 participants [12, 13]. Participants were selected using a non-probability consecutive sampling approach. Every eligible infant born within the study period was included in the sample. This study included premature and low birth weight infants delivered before 37 completed weeks of pregnancy or with a birthweight ranging between 1.5 to 2.5 kg, respectively, who demonstrated functional sucking ability or could breastfeed using a small cup. Parents consenting to participation were included in the study. Babies requiring transfer to the neonatal intensive care unit, those whose parents did not consent, and those who were lost to follow-up in the initial seven days after birth were excluded from the research. Kangaroo Mother Care (KMC) was defined as a care approach that aims to prevent complications such as hypothermia, infections, and prolonged hospitalizations in premature and underweight neonates. It involves three main components which include continuous or intermittent direct skin bonding linking the newborn with the caregiver, support for exclusive breastmilk feeding for the newborn, and early discharge from the hospital to home once the baby is clinically stable. KMC can be commenced immediately after birth, and once the neonate is stable and no longer requires conventional care, and is advised to be continued until the newborn reaches 40 weeks of adjusted gestational age or attains a weight of 2.5 kilograms. Based on pre-defined criteria, the effects of KMC were classified

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as positive or negative. Improved breastfeeding, enhanced parent-infant bonding, physiological stability (stable temperature, heart rate, and respiration), and reduction in early neonatal mortality were counted as a positive effect whereas, excessive crying, skin irritation, difficulty in handling the neonate, or any deterioration in physiological parameters was counted as a negative effect. A self-constructed structured questionnaire was designed and used for data collection and included demographic information, clinical characteristics, KMC implementation, and neonatal outcomes. Infant and maternal details such as age, gender, birth weight, gestational age, and maternal parity, and KMC-related information such as duration of direct skin contact, compliance to the KMC protocol, breastfeeding practices, and any complications observed, and outcome measures including early neonatal mortality (within 7 days), weight gain at discharge, feeding ability, and any positive or negative effects observed during KMC were included in the questionnaire. The questionnaire was tested on a small sample to ensure it was clear and reliable and the data were subsequently collected by trained staff in order to maintain consistency and accuracy. This structured questionnaire was constructed specifically for this study following a review of relevant research on Kangaroo Mother Care and its impact on newborn outcomes in order to include all the relevant information that was required. Although formal assessment of reliability and validity, was not done, but the pre-testing and supervision of data collection by trained staff ensured that the questionnaire provided reliable and accurate data collection. 11 items were included in the questionnaire, covering demographic information, KMC implementation, and neonatal outcomes. Binary scale was used to score each item (Yes=1, No=0). Zero was taken as the lowest possible result was, and 11 was the highest possible result, with higher scores indicating more positive neonatal outcomes and better adherence to the KMC protocols. Pertinent literature on KMC and neonatal outcomes was reviewed and used as a guide in designing the questionnaire. A standardized 2-day training session was conducted by UNICEF to ensure that healthcare providers, parents and family members fully understand and followed the Kangaroo Mother Care (KMC) technique correctly. The principal investigator underwent a 2-day training session conducted by UNICEF to become a certified master trainer and then subsequently this training was trickled down to the rest of the healthcare staff involved in patient care and in this study. A practical demonstration of the KMC technique was given to the parents and carers by trained staff. Detailed explanations, hands-on demonstrations, and practical guidelines for the correct technique were included in these trainings. During the inpatient period, the parents were supervised by the staff, to ensure the proper technique was followed, and to ensure consistency across all participants. Moreover, in order to ensure ongoing adherence to the KMC protocols and to maintain consistency across all participants, regular follow-up sessions were scheduled. Neonatal mortality is defined as the death of a live born infant, within the first 28 days of life. It can be further divided into early or late, which occurs within the first seven days of life, or between days 7 and 28 respectively. Prematurity is defined as birth before 37 completed weeks of gestation, whereas those who weigh under 2.5 kilograms (2500 grams) at birth are considered to have low birth weight. Early neonatal mortality (death within the first 7 days of life) was the primary outcome variable used to assess the effectiveness of the intervention. Secondary outcome variables included ability to feed, hospital stay period, and discharge weight gain. Parents and family members were educated on the three key elements of KMC which included skin-to-skin bonding, breastmilk feeding exclusively, and shortened hospital stay. Proper KMC techniques were demonstrated to all participants, and data was recorded through the self-constructed structured questionnaire. Patient confidentiality was maintained and contact details were kept confidential, and follow-up was scheduled either virtually via telephone or face-to face through an outpatient visit within the first week of life. Data were analyzed using SPSS version 21.0, with standard deviation and mean calculated for quantitative variables such as length of pregnancy, duration of hospital stay, and newborn birthweight, and frequencies and percentages for categorical variables such as gender and effects of KMC. Stratification was used to account for effect modifiers including gestational age, time spent in hospital, birth weight, and gender, and the Chi-square or Fisher exact test was applied post-stratification. A p-value of 0.05 or lower was interpreted as suggestive of statistical significance, and results with $p \leq 0.05$, denoting statistical significance, are marked with an asterisk (*) in tables and figures.

RESULTS

In this study, 210 participants were included to establish the impacts of Kangaroo Mother Care in the reduction of early neonatal death rate among premature and underweight babies. The demographics of the neonates and mothers were the maternal age, gestational age, length of stay and birth weight where the means of the variables, standard deviations, confidence limits and ranges have been documented (Table 1).

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Table 1: Descriptive Statistics (N=210)

Variables	Mean	SD	95% CI	Min	Max	Range
Age of mother (years)	26.99	4.3	26.40 – 27.57	18	40	22
Gestational Age (weeks)	34.8	3.6	34.31 – 35.28	30	36	6
Duration of Hospital Stay (weeks)	7.3	1.9	7.04 – 7.55	1	15	14
Birth Weight (kg)	2.21	0.37	2.18 – 2.29	1.55	2.40	0.85

The results were analyzed as follows: the age (mean ± standard deviation) of the mothers was 26.99 ± 4.3 years, with a confidence interval (C.I.) of 26.40 to 27.57 years. The gestational age (mean ± standard deviation) was 34.8 ± 3.6 weeks, with a C.I. of 34.31 to 35.28 weeks. The mean ± SD duration of hospital stays was 7.3 ± 1.9 days, with a C.I. of 7.04 to 7.55 days. The mean ± SD birth weight was 2.24 ± 0.37 kg, with a C.I. of 2.18 to 2.29 kg. Among the newborns, 57.6% (n = 121) were male and 42.4% (n = 89) were female (Figure 1).

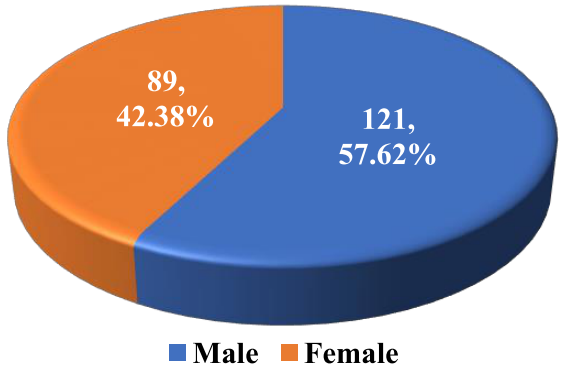

Figure 1: Distribution of Newborns by (N=210)

Regarding outcomes, 71.4% of infants showed a positive effect of Kangaroo Mother Care, while 28.6% exhibited no improvement (Figure 2).

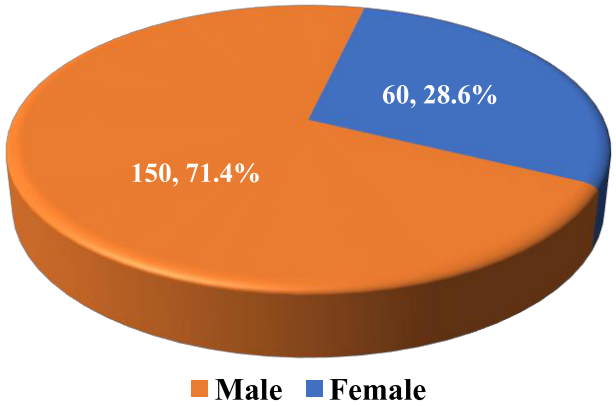

Figure 2: Distribution of Outcomes Following Kangaroo Mother Care (KMC) (N=210)

Kangaroo-mother care was determined to be successful in lowering early neonatal deaths in 60 (28.6%) participants, based on the structured 11-item questionnaire, where positive outcomes were recorded for infants showing improved breastfeeding, stable temperature, weight gain, and survival at 7 days. Each item was scored as Yes = 1 or No = 0, and infants with positive scores on the relevant outcome measures were considered to have benefited from KMC. Stratification of factors such as the mother's age, gestational age, baby's gender, duration of hospital stays, and birth weight was performed to assess the statistical differences in relation to kangaroo-mother care. Chi-square or Fisher's exact tests were applied to assess the linkage between categorical variables and the effect of Kangaroo Mother Care, with statistically significant results indicated (Table 2).

Table 2: Stratification for Variables with Effects (N=210)

Variables	Category	Positive n (%)	Negative n (%)	p-value
Age of Mother (years)	18–30	47 (22.4%)	121 (57.6%)	0.703
	>30	13 (6.2%)	29 (13.8%)	
Gestational Age (weeks)	30–33	19 (9.0%)	33 (15.7%)	0.143
	>33	41 (19.5%)	117 (55.7%)	
Gender of Baby	Male	28 (13.3%)	93 (44.3%)	0.042*
	Female	32 (15.2%)	57 (27.1%)	
Duration of Hospital Stay	1-6	22 (10.5%)	109 (51.9%)	0.0001*
	>6	38 (18.1%)	41 (19.5%)	
Birth Weight (kg)	1.5-2.0	24 (11.4%)	83 (39.5%)	0.045*
	>2.0	36 (17.1%)	67 (31.9%)	

*p ≤ 0.05, statistically significant

DISCUSSIONS

Our study had a mean maternal age of (26.99 4.3) years comparable to the previous studies with mean ages ranging between 25 28 years, whereas our results indicated a 60 percent decrease in neonatal mortality with the use of Kangaroo Mother Care (KMC) as compared to a 40 percent decrease in the past studies, which could have been because of differences in the implementation strategies, the patient characteristics or the healthcare infrastructure [16]. In the same manner, a study that was carried out in COVID-19-positive mothers indicated that there was a considerable decrease in neonatal deaths, hypothermia, and severe infections, which further validated the effectiveness of KMC [17]. Maternal age (P=0.703) and gestational age (P=0.143) in our analysis had no significant relationship with the outcomes of the neonatal. The statistically significant relations were however found in birth weight (P=0.045), gender (P=0.042) and hospital stay duration (P=0.0001). The difference in the resources available in healthcare, the availability of equipment, and quality of prenatal and postnatal care can be the reason behind the observed variation in the studies. The results of this tertiary care facility in Karachi also indicate the issues that can be typical of resource-constrained institutions. KMC has a wide range of physiological and psychological advantages, such as better thermoregulation, increased cardiorespiratory stability,

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increased weight gain, reduced risk of infections, and increased maternal-infant bonding [18-20]. These results support KMC as an inexpensive, effective, and family-based intervention to premature and low birth weight babies. Multiple studies have also demonstrated that the constant contact with the skin will decrease levels of cortisol, normalize heart rates, and lead to better neurodevelopmental patterns in preterm infants [21]. The limitations of the current study are that pre-intervention values of neonatal parameters are not available and that confounding factors like maternal comorbid conditions, socioeconomic, and pregnancy related complications were not controlled and could have affected the outcomes. These areas should be covered in future studies in order to eliminate the independent effects of KMC.

CONCLUSIONS

The findings suggest that Kangaroo Mother Care was successful in lowering early neonatal fatalities. The impact of Kangaroo Mother Care in reducing early newborn mortality needs to be further evaluated and confirmed through comprehensive prospective cohort studies and randomized trials.

Authors Contribution

Conceptualization: FNB
Methodology: ZK
Formal analysis: DESW, ZAP
Writing review and editing: HMI, FNB, SS, AW

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] World Health Organization. Care of the Preterm and Low-Birth-Weight Newborn. World Health Organization, Geneva, Switzerland. 2018.

[2] Morniroli D, Tiraferri V, Maiocco G, De Rose DU, Cresi F, Coscia A, et al. Beyond Survival: The Lasting Effects of Premature Birth. Frontiers in Pediatrics. 2023 Jul; 11:1213243. doi: 10.3389/fped.2023.1213243.

[3] World Health Organization. World Health Statistics Overview 2019: Monitoring Health for the SDGs, Sustainable Development Goals. World Health Organization. 2019.

[4] Muzzamil M, Nisa M, Raza S. The Survival Rate of Neonates in Pakistan: Problems in Health Care Access, Quality and Recommendations. Health Promotion Perspectives. 2022 Dec; 12(4):355. doi: 10.34172/hpp.2022.46.

[5] Devaguru A, Gada S, Potpalle D, Eshwar MD, Purwar D. The Prevalence of Low Birth Weight Among Newborn Babies and Its Associated Maternal Risk Factors: A Hospital-Based Cross-Sectional Study. Cureus. 2023 May; 15(5). doi: 10.7759/cureus.38587.

[6] Hussen A, Bayisa K. Determinants of Low Birth Weight Among Newborns Delivered at Mettu Karl Comprehensive Specialized Hospital, Southwest Ethiopia: A Case-Control Study. Scientific Reports. 2024 Feb; 14(1): 4399. doi: 10.1038/s41598-024-54248-w.

[7] Flaherman VJ, Ginsburg AS, Nankabirwa V, Braima da Sa A, Medel-Herrero A, Schaefer E, *et al.* Newborn Weight Change and Predictors of Underweight in the Neonatal Period in Guinea-Bissau, Nepal, Pakistan and Uganda. Maternal and Child Nutrition. 2022 Oct; 18(4): e13396. doi: 10.1111/mcn.13396.

[8] World Development Indicators (WDI) [Internet]. Knoema. 2019 [cited 2AD]. Available from: https://knoema.com/WBWDI2019Jan/world-development-indicators-wdi.

[9] Hall M, Valencia CM, Soma-Pillay P, Luyt K, Jacobsson B, Shennan A, *et al*. Effective and Simple Interventions to Improve Outcomes for Preterm Infants Worldwide: The FIGO PremPrep-5 Initiative. International Journal of Gynecology and Obstetrics. 2024 Jun; 165(3): 929-35. doi: 10.1002/ijgo.15269.

[10] Sivanandan S, Sankar MJ. Kangaroo Mother Care for Preterm or Low Birth Weight Infants: A Systematic Review and Meta-Analysis. BMJ Global Health. 2023 Jun; 8(6): e010728. doi: 10.1136/bmjgh-2022-010728.

[11] Aziz PM. Experience and Expression of Postnatal Mothers Practicing Kangaroo Mother Care: A Qualitative Study. SAGE Open Medicine. 2024 Sep; 12:20503121241266493. doi: 10.1177/20503121241266493.

[12] World Health Organization. Standards for Improving Quality of Maternal and Newborn Care in Health Facilities. World Health Organization. 2016.

[13] Mohammadi M, Bergh AM, Heidarzadeh M, Hosseini M, Sattarzadeh Jahdi N, Valizadeh L, *et al*. Implementation and Effectiveness of Continuous Kangaroo Mother Care: A Participatory Action Research Protocol. International Breastfeeding Journal. 2021 Mar; 16(1): 24. doi: 10.1186/s13006-021-00367-3.

[14] Adejuyigbe EA, Agyeman I, Anand P, Anyabolu HC, Arya S, Assenga EN, *et al.* Evaluation of the Impact of Continuous Kangaroo Mother Care (KMC) Initiated

DOI: https://doi.org/10.54393/pjhs.v6i11.2820

Immediately after Birth Compared to KMC Initiated after Stabilization in Newborns with Birth Weight 1.0 to <1.8 kg on Neurodevelopmental Outcomes: Protocol for a Follow-Up Study. Trials. 2023 Apr; 24(1): 265. doi: 10.1186/s13063-023-07192-5.

[15] Nyqvist KH, Anderson GC, Bergman N, Cattaneo A, Charpak N, Davanzo R, *et al.* Towards Universal Kangaroo Mother Care: Recommendations and Report from the First European Conference and Seventh International Workshop on Kangaroo Mother Care. Acta Paediatrica. 2010 Jul; 99(6): 812-9. doi: 10.1111/j.1651-2227.2010.01787.x.

[16] Mukhola BA. Kangaroo Mother Care Practice during the COVID-19 Pandemic among Postnatal Mothers of Preterms in Kenyatta National Hospital's Newborn Unit. [Doctoral Dissertation]. University of Nairobi. 2021.

[17] Badiee Z, Faramarzi S, Mirizadeh T. The Effect of Kangaroo Mother Care on Mental Health of Mothers with Low-Birth-Weight Infants. Advanced Biomedical Research. 2014 Jan; 3(1):214. doi: 10.4103/2277-9175.143262.

[18] World Health Organization. Kangaroo Mother Care: A Transformative Innovation in Health Care. Global Position Paper. World Health Organization. 2023 May.

[19] Minckas N, Medvedev MM, Adejuyigbe EA, Brotherton H, Chellani H, Estifanos AS, *et al.* Preterm Care during the COVID-19 Pandemic: A Comparative Risk Analysis of Neonatal Deaths Averted by Kangaroo Mother Care versus Mortality due to SARS-CoV-2 Infection. EClinicalMedicine. 2021 Mar; 33:100733. doi: 10.1016/j.eclinm.2021.100733.

[20] Pados BF, Hess F. Systematic Review of the Effects of Skin-to-Skin Care on Short-Term Physiologic Stress Outcomes in Preterm Infants in the Neonatal Intensive Care Unit. Advances in Neonatal Care. 2020 Feb; 20(1):48-58. doi: 10.1097/ANC.0000000000000596.

[21] Ionio C, Ciuffo G, Landoni M. Parent-Infant Skin-to-Skin Contact and Stress Regulation: A Systematic Review of the Literature. International Journal of Environmental Research and Public Health. 2021 Apr; 18(9):4695. doi: 10.3390/ijerph18094695.