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Evaluating Postnatal Mothers' Knowledge Of Kangaroo Mother Care Practices With The Newborn Baby, India

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Abstract

Background: Kangaroo Mother Care (KMC) is a cost-effective, evidence-based practice that improves survival and health outcomes in preterm and low birth weight infants. Maternal understanding and correct implementation of KMC are essential for its success.
Objective: This study aimed to assess the knowledge of postnatal mothers regarding KMC practices in the eastern zone of India.
Methods: A cross-sectional study was conducted among 320 postpartum mothers in the newborn care unit of SVP PG Institute of Paediatrics, Cuttack, Odisha. Participants were selected using purposive sampling. A structured questionnaire was used to collect data, which was analysed using SPSS version 25. Logistic regression was applied to determine factors associated with KMC knowledge.
Results: Out of the 320 participants, 46.66% demonstrated good knowledge of KMC, 26.66% had very good knowledge, 16.66% had average knowledge, and 10% had poor knowledge. Multivariate analysis revealed that mothers aged ≥30 years (AOR = 2.874; 95% CI: 1.102–7.498; p = 0.031), those with secondary education and above (AOR = 5.762; 95% CI: 2.114–15.703; p < 0.001), and employed mothers (AOR = 3.214; 95% CI: 1.245–8.296; p = 0.015) were more likely to have good knowledge. However, knowledge about the recommended duration of KMC was significantly lower (AOR = 0.682; p = 0.045).
Conclusion: Although postnatal mothers exhibited a fair understanding of KMC, gaps remain, particularly regarding its duration. Integrative and targeted educational strategies are necessary to enhance maternal knowledge and promote optimal neonatal care practices.

Keywords: postnatal mothers, KMC (Kangaroo Mother Care), New-born, Sardar Vallavbhai Patel (SVP).

INTRODUCTION:

The postpartum period is a crucial phase for both the mother and the newborn, significantly influencing the child's survival, health, and development. Strong mother-infant relationships (MIRs) are vital for the emotional and social well-being of infants, particularly in the context of preterm and low birth weight (LBW) births. Globally, preterm birth complications remain the leading cause of neonatal mortality, accounting for 35% of the 2.5 million neonatal deaths annually (1). Approximately 15 million babies are born preterm each year, representing over 10% of all live births worldwide (2). Low birth weight, often associated with preterm births, contributes to increased morbidity and developmental challenges (3).

India contributes significantly to the global burden of preterm births, with an estimated 3.5 million preterm deliveries annually, making it the country with the highest number of preterm births (4). The National Family Health Survey-5 (NFHS-5) reports that 18.2% of Indian newborns have LBW (<2,500 g) (5). Despite various neonatal care advancements, neonatal mortality in India remains at 22 per 1,000 live births (6). Odisha, a state with a high neonatal mortality rate of 27 per 1,000 live births, faces additional challenges due to disparities in healthcare accessibility and awareness (7). Kangaroo Mother Care (KMC) has emerged as a cost-effective and evidence-based intervention that significantly improves neonatal outcomes, particularly for preterm and LBW infants (8). KMC involves prolonged skin-to-skin contact, exclusive breastfeeding, and early discharge with proper follow-up. The WHO (2023) has endorsed KMC as a life-saving approach that can reduce neonatal mortality by 25% in LBW infants and improve physiological stability, thermoregulation, breastfeeding rates, and maternal-infant bonding (9). Studies from developed countries indicate that KMC has been successfully integrated into neonatal intensive care units (NICUs), leading to better long-term neurodevelopmental outcomes (10). However, despite its proven benefits, the adoption of KMC remains inconsistent, particularly in resource-limited settings. In India, while major urban hospitals have implemented KMC in 60-70% of neonatal units, rural healthcare facilities report significantly lower adoption rates due to inadequate infrastructure, lack of trained healthcare providers, and insufficient maternal awareness (11). A study conducted in Odisha found that only 40% of postnatal mothers had adequate knowledge of KMC, and less than 30% practiced it regularly (12). These statistics highlight the pressing need for increased awareness and training regarding KMC among postnatal mothers and healthcare providers, particularly in low-resource settings.

Despite growing global evidence supporting KMC, there remains a significant gap in its knowledge and utilization among postnatal mothers in India, particularly in rural and underserved regions. Previous studies have primarily focused on KMC's clinical benefits, with limited research exploring maternal awareness, perceptions, and barriers to its implementation. Addressing these gaps is critical to ensuring the widespread adoption of KMC as a standard neonatal care practice.

This study aims to evaluate the postpartum mothers' knowledge of KMC practices, examine the factors influencing its adoption, and identify the association between demographic variables and maternal awareness levels. By bridging this research gap, the study will contribute to developing targeted educational and policy interventions to enhance neonatal survival and health outcomes.

METHODOLOGY:

ETHICAL CONSIDERATIONS

Ethical clearance for the study was obtained from the Institutional Ethics Committee of SVP Postgraduate Institute of Paediatrics, Odisha, India. After explaining the purpose, procedures, and voluntary nature of the study, written informed consent was obtained from all participants. Participant confidentiality and anonymity were strictly maintained. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

STUDY DESIGN AND SETTING

A CROSS-SECTIONAL DESCRIPTIVE STUDY

The study adopted a quantitative, cross-sectional design and was conducted in selected tertiary care hospitals across India that provided maternal and neonatal healthcare services. Hospitals were selected based on accessibility, patient volume, and the availability of Kangaroo Mother Care (KMC) facilities. One of the primary

study sites was the newborn unit at SVP Postgraduate Institute of Paediatrics, Cuttack, Odisha. Data were collected from May to October 2024 to assess postnatal mothers' knowledge and awareness of KMC practices.

SAMPLING SIZE AND SAMPLING METHODS

A systematic random sampling technique was employed to recruit participants from the selected hospitals, wherein every nth eligible postnatal mother admitted during the study period was included until the required sample size was achieved. The sample size for this cross-sectional study was calculated using the formula:

$$n = \frac{Z^2\ P(1-P)}{d^2}$$

where n is the required sample size, Z is the Z-score (1.96 for a 95% confidence level), P is the estimated prevalence of knowledge regarding Kangaroo Mother Care (KMC), and d is the allowable margin of error (0.05). Based on a previous study by Yadav et al. (2019), where 42% of mothers were reported to have adequate knowledge of KMC, a prevalence of 0.42 was used for the calculation. This resulted in an initial sample size of approximately 290. To account for potential non-response and incomplete data, the sample size was increased by 10%, yielding a final sample size of 320 participants [13].

PARTICIPANTS

We recruited postnatal mothers who had delivered within the last 48 hours and had stable newborns eligible for Kangaroo Mother Care (KMC). Mothers were included if they were willing to participate, able to provide informed consent, and had no communication barriers. We excluded postnatal mothers with critically ill newborns requiring intensive care, those with known cognitive impairments or communication difficulties, and those unwilling to participate in the study.

DATA COLLECTION PROCESS

Participants who met the eligibility criteria and expressed willingness to participate were enrolled in the study after providing written informed consent. Each participant received an information sheet outlining key aspects of the study, including its purpose, procedures, voluntary nature of participation, potential risks and benefits, confidentiality safeguards, and their rights as participants. Sufficient time was allotted for participants to review the information, ask questions, and make an informed decision regarding their participation. The level of knowledge among postpartum mothers was assessed using a structured questionnaire. The tool comprised two sections: Section A collected patient demographic information, including age, religion, occupation, education, household structure, and the number of children. Section B consisted of a structured, closed-ended knowledge questionnaire with 20 items designed to assess mothers' knowledge of Kangaroo Mother Care (KMC)practices.

STATISTICAL ANALYSIS

Data were analyzed using SPSS version 20 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequency, percentage, mean, range, and standard deviation, were used to summarise demographic and clinical characteristics. The Shapiro-Wilk test assessed the normality of the data. Inferential statistics, such as the Chi-square test, binary logistic regression analysis was performed to identify predictors of key outcome variables, adjusting for potential confounders. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to measure the strength of associations.

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RESULT

DEMOGRAPHIC CHARACTERISTICS OF POSTNATAL MOTHERS

Table 1: Demographic Characteristics of Postnatal Mothers (n=320)

SL. NO.	Sample Characteristics	variables	(f)	(%)
1	Age	15-20 yrs	32	10
		21-25 yrs	150	46.9
		26-30 yrs	106	33.1
		>31 yrs	32	10
2	Religion	Hindu	263	83.1
		Muslim	45	14.1
		Christian	9	2.8
3	Education			
		Secondary	54	16.9
		Higher Secondary	234	73.1
		Illiterate	32	10
4	Occupation	Housewife	246	76.9
		Govt employee	23	7.2
		Pvt employee	10	3.1
		Labour	41	12.8
5	Type of Family	Nuclear	86	26.9
		Joint	192	60.0
		Extended	4	13.2
6	Residence	Village	278	86.9
		City	42	13.1
7	Monthly Income	< 10000	86	26.9
		10000-20000	118	36.9
		20000-30000	106	33.1
		>30000	10	3.1
8	No of Pregnancy	Primi	214	66.9
		Multi	106	33.1
9	No of Children	One	86	26.9
		Two	224	70
		More than two children	10	3.1

Table 1 summarizes the socio-demographic characteristics of the participants. The age of participants ranged from 15 to over 31 years, with a mean age of 25.1 years and a standard deviation (SD) of ±4.3. The majority, 150 (46.9%), were aged 21–25 years, followed by 106 (33.1%) aged 26–30 years. Most mothers, 263 (83.1%), were Hindu, while 45 (14.1%) were Muslim and 9 (2.8%) were Christian. In terms of education, 234 (73.1%) had completed higher secondary education, 54 (16.9%) had secondary education, and 32 (10%) were illiterate. Regarding occupation, 246 (76.9%) were housewives, 23 (7.2%) worked in government jobs, 10 (3.1%) in the private sector, and 41 (12.8%) were labourers. Family structure data showed that 192 (60%) lived in joint families, 86 (26.9%) in nuclear families, and 42 (13.1%) in extended families. A large proportion, 278 (86.9%), resided in rural areas. Monthly household income varied, with the majority earning between ₹10,000–20,000 (36.9%), followed by ₹20,000–30,000 (33.1%), and a mean income of ₹16,900 (SD ± ₹5,500). In terms of parity, 214 (66.9%) were primigravida. The mean number of children was 1.77 (SD ± 0.56).

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POSTNATAL MOTHER'S KNOWLEDGE OF KMC PRACTICE.

Table 2: Knowledge of postnatal mothers regarding KMC practice present at the newborn care unit at SVP PG Institute.

Knowledge level	Frequency (f)	Percentage (%)
Poor (0-40%)	32	10
Average (41-60%)	53	16.6
Good (61-80%)	149	46.6
Very Good (≥81%)	86	26.8

Table 2 presents the distribution of knowledge levels among postnatal mothers regarding Kangaroo Mother Care (KMC) practices in the newborn care unit at SVP PG Institute. Out of the 320 participants, the majority, 149 (46.6%), demonstrated a good level of knowledge (61–80%), while 86 mothers (26.8%) had a very good understanding (≥81%) of KMC practices. A smaller proportion, 53 (16.6%), exhibited an average level of knowledge (41–60%), and only 32 mothers (10%) had poor knowledge (≤40%).

Table 3: Area-wise Distribution of Knowledge Scores Regarding Kangaroo Mother Care (KMC) Among Postnatal Mothers (n = 320)

SL NO.	Knowledge Domain	Maximum score	Max score	Mean ± SD	Mean percentage
1	Knowledge of KMC	9	9	6.7±1.72	74.4%
2	Benefits of KMC	5	5	3.7±1.10	74%
3	Environment and Positioning related to KMC	3	3	2.0±0.85	66.67%
4	Duration of KMC	3	3	1.7±1.10	56.67%

SD = Standard Deviation

Table 3 presents the area-wise distribution of knowledge scores related to Kangaroo Mother Care (KMC) among postnatal mothers (N = 320). The highest level of knowledge was observed in the domain "Knowledge of KMC", with a mean score of 6.7 out of 9 (74.4% ± 1.72), indicating that mothers are relatively well-informed about the general concept of KMC. The "Benefits of KMC" domain also showed a strong mean score of 3.7 out of 5 (74.0% ± 1.10). In contrast, knowledge related to the "Environment and Positioning" had a lower mean score of 2.0 out of 3 (66.7% ± 0.85), while the "Duration of KMC" scored the lowest, with a mean of 1.7 out of 3 (56.7% ± 1.10), suggesting limited understanding in these practical areas. The total mean knowledge score was 14.1 out of 20, corresponding to an overall mean percentage of 67.9%, which reflects a moderate level of awareness among the participants. These findings highlight the need for targeted educational strategies, especially emphasising the correct duration and positioning techniques involved in KMC, to enhance comprehensive maternal knowledge and optimize newborn care outcomes.

ASSOCIATION BETWEEN DEMOGRAPHIC VARIABLES AND THE KMC KNOWLEDGE SCORE

The chi-square analysis for the association between socio-demographic variables and postnatal mothers' knowledge of Kangaroo Mother Care (KMC). Education ($\chi^2 = 16.98$, $p = 0.049$) and occupation ($\chi^2 = 18.56$, $p = 0.030$) showed significant associations with knowledge scores. Mothers with higher education and those employed in the government or private sectors had better knowledge. Although other variables were not statistically significant, younger mothers and those from joint families or rural areas showed relatively better knowledge, indicating a need for focused awareness among less-educated, non-working mothers.

Table 4: Logistic Regression Analysis Showing Association Between Socio-Demographic Variables and Knowledge on KMC Among Postnatal Mothers (n=320)

Variable	OR	95% CI (Lower)	95% CI (Upper)	p-value	AOR	95% CI (Lower)	95% CI (Upper)	p-value
Age Group								
15–20 years	1	–	–	–	1	–	–	–
21–25 years	2.432	1.002	5.914	0.050	1.981	0.812	4.832	0.129
26–30 years	3.162	1.203	8.314	0.019	2.542	0.911	7.089	0.076
>31 years	3.874	1.118	13.420	0.033	2.874	1.102	7.498	0.031
Education								
Illiterate	1	–	–	–	1	–	–	–
Secondary and above	6.429	2.420	17.069	<0.001	5.762	2.114	15.703	<0.001
Occupation								
Housewife	1	–	–	–	1	–	–	–
Employed	3.112	1.217	7.958	0.017	3.214	1.245	8.296	0.015
Knowledge of KMC Duration	0.714	0.451	1.133	0.140	0.682	0.412	1.129	0.045

OR: Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval; $p < 0.05$ statistically significant.

Logistic regression analysis revealed that mothers aged 26–30 years (OR = 3.162, 95% CI: 1.203–8.314, p = 0.019) and those over 31 years (OR = 3.874, 95% CI: 1.118–13.420, p = 0.033) were significantly more likely to have good knowledge of Kangaroo Mother Care (KMC) compared to those aged 15–20 years. After adjusting for potential confounders, the association remained significant for mothers over 31 years (AOR = 2.874, 95% CI: 1.102–7.498, p = 0.031), indicating a positive relationship between age and KMC knowledge. Education was also a strong predictor, with mothers having secondary education or above significantly more likely to be knowledgeable (AOR = 5.762, 95% CI: 2.114–15.703, p < 0.001). Employed mothers were more knowledgeable than housewives (AOR = 3.214, p = 0.015). Although knowledge of KMC duration was not significant in the crude model, it showed a marginal association after adjustment (p = 0.045), highlighting a potential area for targeted education represented in Table 4.

DISCUSSION:

The present study underscores a moderate level of knowledge regarding Kangaroo Mother Care (KMC) among postnatal mothers, with 46.6% demonstrating good knowledge and 26.8% exhibiting very good understanding. These findings are consistent with previous studies conducted in similar settings.

For instance, a study in Central Tanzania reported that only 38% of postnatal mothers had adequate knowledge about KMC, highlighting the need for enhanced educational interventions [14]. Similarly, research in Gulbarga, India, found that 53% of postnatal mothers had poor knowledge regarding KMC, emphasizing the necessity for targeted awareness programs [15].

The association between higher education levels and better KMC knowledge observed in our study aligns with findings from Ethiopia, where mothers with secondary education or above were significantly more likely to be knowledgeable about KMC practices [16]. Furthermore, employment status, particularly in government or private sectors, was linked to improved knowledge, suggesting that workplace health programs could play a pivotal role in disseminating KMC information.

Age also emerged as a significant predictor, with mothers aged 26–30 and over 31 years displaying higher knowledge levels. This trend mirrors observations from studies in Ethiopia and Tanzania, where older maternal age correlated with increased KMC awareness [14,16].

Despite these positive associations, certain areas, such as knowledge about the duration of KMC, remain deficient. Our study found that the "Duration of KMC" domain scored the lowest, indicating a gap in

understanding that could impact the effectiveness of KMC practices. This deficiency is echoed in research from Saudi Arabia, where limited knowledge about KMC duration was identified as a barrier to effective implementation [17].

Maternal age was another strong predictor in our analysis. Mothers aged 26–30 and those over 31 were more likely to have good KMC knowledge compared to younger mothers. This pattern is consistent with prior findings from Ethiopia and Nigeria, where older women had better KMC awareness (16, 18).

Although general knowledge and perceived benefits of KMC scored relatively high, knowledge regarding the recommended duration and correct positioning was comparatively low. The lowest domain score was recorded for "Duration of KMC," indicating a gap in understanding essential to achieving the method's full benefits. Studies from Nepal and Saudi Arabia have similarly noted limited knowledge in these practical aspects of KMC (17, 19).

Structured interventions such as health talks, antenatal classes, and audiovisual aids have been shown to significantly improve KMC knowledge. In a study conducted in Azamgarh, Uttar Pradesh, structured teaching interventions led to marked improvements in maternal knowledge levels (20). Another multi-country implementation study in Ethiopia and India emphasized the importance of training community health workers to enhance maternal understanding and practice of KMC (21).

Efforts to scale up KMC need to consider the socio-cultural dynamics of the communities involved. For instance, research from Indonesia noted that family involvement and cultural practices heavily influenced the acceptability and practice of KMC among mothers (22). Moreover, the WHO continues to advocate for KMC as an effective, low-cost intervention for preterm and low-birth-weight infants, yet acknowledges the challenge of integrating this knowledge at the grassroots level (23).

Studies in India, such as those by Achun et al. and Samson et al., also emphasized the effectiveness of tailored health education sessions in improving KMC awareness among postnatal mothers (15, 20). More recently, digital health tools and mobile-based reminders have shown promise in improving both knowledge and compliance with KMC in rural and urban settings (24, 25).

STRENGTHS AND LIMITATIONS

This study offers several notable strengths that enhance the credibility and relevance of its findings. A major strength is the specific focus on postnatal mothers within a newborn care unit, ensuring contextual relevance to Kangaroo Mother Care (KMC) practices. The use of a structured, pre-tested questionnaire facilitated uniform data collection, enhancing the reliability and validity of responses. The inclusion of both bivariate and multivariate logistic regression analyses allowed for a robust examination of associations between socio-demographic variables and knowledge on KMC, while adjusting for potential confounders. Furthermore, the study provides region-specific insights from Odisha, contributing valuable evidence to an underexplored area of maternal and newborn health. The area-wise assessment of KMC knowledge covering duration, positioning, and benefits also helped identify key knowledge gaps, offering guidance for targeted educational initiatives.

However, the study has certain limitations. Although the sample size of 320 participants strengthens statistical power, the single-centre design limits the generalizability of findings to broader populations or other healthcare settings. The cross-sectional nature of the study precludes causal inference between socio-demographic characteristics and knowledge levels. Potential social desirability bias may have influenced self-reported knowledge responses. Additionally, the exclusion of discharged or unavailable mothers during data collection may have introduced selection bias. The absence of qualitative inquiry further limits insight into cultural, systemic, or personal factors that may influence KMC knowledge and practice.

IMPLICATIONS FOR PRACTICE

Findings highlight the need for targeted educational interventions focusing on KMC duration and positioning, particularly among younger, less-educated, and unemployed mothers. Integrating structured KMC education into postnatal care services can enhance maternal knowledge, promote consistent practice, and improve neonatal outcomes in similar low-resource healthcare settings.

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AUTHOR CONTRIBUTIONS:
Nirupama Mohapatra, Kabita Puhan, and Puspanjali Mohapatro contributed to the study conception and design, participant recruitment and screening, data acquisition, statistical analysis, data interpretation, and drafting of the manuscript. Sushrita sahoo, Chanchala Kar, Jyotshnamayee Hota, Mamata Puhan and Puspanjali Mohapatro contributed to participant screening, statistical analysis, data interpretation, manuscript drafting, and overall coordination and supervision of the study. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work, ensuring its accuracy and integrity.

CONFLICT OF INTEREST:
All authors declare no conflict of interest regarding this research.

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This study did not receive any funding or financial support from any governmental or nongovernmental Organization.

DATA AVAILABILITY: All data are available from the corresponding author.

CONCLUSION:
This study underscores moderate overall knowledge of KMC among postnatal mothers, with notable gaps in specific domains like duration and positioning. Socio-demographic factors, particularly age, education, and employment, significantly influenced knowledge levels. Strengthening targeted, evidence-based education within maternal care services is essential to improve KMC practices and neonatal health.

ABBREVIATION:
KMC-Kangaroo Mother Care
WHO- World Health Organisation.
UNICEF- United Nation's International Children's Emergency Fund.
SCB-Sriram Chandra Bhanja
SVP-Sardar Vallabhai Patel
NICU- Neonatal Intensive Care Unit
PG- post-graduate

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