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Effectiveness Of A Structured Educational Package Regarding Kangaroo Mother Care (Kmc) On Risk Of Postnatal Depression Among Mothers Of Babies Admitted In Nicu: A Quasi-Experimental Study, Indore

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Abstract: This quasi-experimental study assessed the effectiveness of a structured educational package on Kangaroo Mother Care (KMC) in reducing the risk of postnatal depression (PND) among mothers of newborns admitted to the Neonatal Intensive Care Unit (NICU) of a selected tertiary hospital in Indore. A total sample of **100 mothers** (50 intervention, 50 comparison) was enrolled using consecutive sampling. The intervention group received a structured educational package (verbal counselling, demonstration, 12-minute video, and printed leaflet) plus routine NICU support; the comparison group received routine NICU care only. Primary outcome was risk of PND measured by the Edinburgh Postnatal Depression Scale (EPDS) at baseline (during NICU stay) and at 6 weeks postpartum. Secondary outcomes included maternal knowledge about KMC and self-reported KMC practice. Data were analysed using descriptive statistics, paired and independent t-tests, Chi-square tests and logistic regression to adjust for confounders. The intervention group demonstrated a statistically significant reduction in mean EPDS score from baseline to 6 weeks (mean $\Delta = -5.8$, $p < 0.001$) and a marked reduction in proportion at risk of PND (EPDS ≥ 13) compared with the comparison group (18% vs 54%, $p < 0.001$). Adjusted logistic regression showed mothers in the intervention group had lower odds of PND risk at 6 weeks (AOR = 0.21; 95% CI: 0.08–0.57). The structured educational package on KMC effectively reduced risk of PND among NICU mothers. Integration of structured KMC education into routine NICU practice is recommended.

Index Terms - Kangaroo Mother Care, Postnatal Depression, Edinburgh Postnatal Depression Scale, NICU, Educational Package

INTRODUCTION

Postnatal depression (PND) is a common and serious maternal mental-health disorder that can develop within the first year after childbirth. It adversely affects maternal functioning, mother–infant bonding, breastfeeding, and long-term child development, and it places a substantial burden on families and health systems. Estimates of PND prevalence vary by population and measurement method, but community studies suggest rates often range from 10% to 20% and may be substantially higher among mothers exposed to added stressors.

Mothers whose newborns require admission to a Neonatal Intensive Care Unit (NICU) represent a particularly vulnerable subgroup. NICU admission separates mothers from their infants, imposes unpredictable stress related to infant health and prognosis, and introduces complex care environments and unfamiliar procedures. These stressors increase the likelihood of anxiety, acute stress reactions, and depressive symptoms during the postpartum period. Several studies report higher PND and anxiety prevalence among NICU mothers compared with mothers of healthy newborns, with consequences that include delayed bonding, difficulties with breastfeeding initiation and continuation, and reduced maternal confidence in caregiving.

Kangaroo Mother Care (KMC)—defined by prolonged skin-to-skin contact between mother and baby, early and exclusive breastfeeding where possible, and support for early discharge with follow-up—has a strong evidence base for improving neonatal thermal regulation, breastfeeding rates, and physiologic stability, especially for low birthweight and preterm infants. Beyond these neonatal benefits, KMC also appears to promote maternal–infant attachment, reduce maternal stress, and enhance feelings of competence and emotional well-being. Mechanisms proposed for these psychological benefits include the neurobiological effects of skin-to-skin contact (e.g., oxytocin release), increased opportunities for responsive caregiving, and the practical empowerment gained through active participation in neonatal care.

Despite KMC's potential psychosocial benefits, mere availability of KMC as a clinical option does not guarantee adoption. Barriers include lack of maternal knowledge, limited nursing support, cultural perceptions, logistic constraints within NICU settings, and maternal fear about handling clinically fragile infants. Structured educational interventions—combining counselling, demonstration, audiovisual aids, and follow-up reinforcement—are one feasible strategy to increase maternal knowledge, confidence, and actual KMC practice. When delivered by trained nursing staff, such packages can bridge the gap between clinical recommendation and practical implementation, potentially magnifying both neonatal and maternal outcomes.

However, evidence from low- and middle-income country settings, including India, on the effect of structured KMC education specifically on maternal mental health outcomes is limited. Most KMC research has prioritized neonatal physiological outcomes; comparatively fewer studies have evaluated maternal psychological endpoints such as PND using validated screening instruments. Given the dual burden of high neonatal morbidity and under-recognised maternal mental-health needs in NICU populations, targeted interventions that are low-cost, scalable, and potentially beneficial for both mother and infant merit rigorous evaluation.

Study rationale and objective. In this context, the present study was designed to evaluate whether a nurse-delivered structured educational package on KMC reduces the risk of postnatal depression among mothers of newborns admitted to a tertiary-level NICU in Indore. The primary objective was to compare change in Edinburgh Postnatal Depression Scale (EPDS) scores and proportion at risk for PND between mothers receiving the structured package and those receiving routine care. Secondary objectives included assessing change in maternal KMC knowledge and adherence to KMC practice. This study aims to inform NICU nursing practices and practical policy recommendations for integrating maternal mental-health–oriented education into routine neonatal care.

NEED OF THE STUDY

Postnatal depression (PND) is increasingly recognized as a critical public-health concern due to its profound and long-lasting impact on maternal well-being, infant development, and overall family functioning. Evidence shows that untreated PND is associated with impaired mother–infant bonding, delayed cognitive and emotional development in infants, poor breastfeeding outcomes, and increased healthcare utilization. In clinical practice, mothers whose newborns require admission to the Neonatal Intensive Care Unit (NICU) constitute a particularly high-risk group. Separation from the infant, exposure to technologically complex environments, anxiety about neonatal prognosis, and restricted opportunities for early bonding all exacerbate emotional distress and make NICU mothers up to three times more likely to experience depressive symptoms compared to mothers of healthy neonates. Despite this heightened vulnerability, mental-health screening and psychosocial interventions for NICU mothers remain limited in many Indian healthcare settings.

Kangaroo Mother Care (KMC) has been globally promoted as an evidence-based neonatal intervention that enhances thermoregulation, breastfeeding, weight gain, sleep patterns, and physiological stability. Importantly, emerging literature also highlights the psychological benefits of KMC for mothers, including improved bonding, reduced stress levels, enhanced caregiving confidence, and decreased depressive symptoms. However, many mothers—especially those experiencing the emotional strain of NICU admission—lack adequate knowledge, skills, and confidence to initiate and maintain KMC. Barriers such as fear of handling medically fragile infants, misconceptions, lack of structured guidance, and inconsistent counselling by healthcare staff further hinder effective KMC practice. These challenges underscore the need for systematic educational support rather than sporadic or informal counselling.

While international studies have explored the association between KMC and maternal psychological outcomes, research in the Indian context remains scarce, particularly regarding structured KMC educational interventions targeting postnatal depression. Most existing studies focus primarily on neonatal physiological benefits, leaving a significant research gap in understanding how KMC education can be leveraged as a maternal mental-health intervention. Moreover, there is limited evidence on whether nurse-delivered educational packages—incorporating demonstration, audiovisual tools, reinforcement, and follow-up—can effectively reduce depressive symptoms among NICU mothers.

Given the dual challenges of high NICU admissions and underdiagnosed PND in India, there is a compelling need to explore and implement feasible, low-cost, and nurse-led interventions that can simultaneously support neonatal outcomes and promote maternal psychological well-being. A structured educational package on KMC offers a practical strategy that can be seamlessly integrated into routine NICU care. Assessing its effectiveness in reducing PND will not only contribute to evidence-based nursing practice but also guide policymakers in strengthening postpartum mental-health interventions within neonatal services.

Therefore, this study is essential to address a critical gap in current healthcare practices and to evaluate whether structured KMC education can serve as an effective, scalable intervention to mitigate the risk of postnatal depression among mothers of NICU-admitted infants.

Study Design:
A quasi-experimental, two-group, pretest–posttest design was adopted to evaluate the effectiveness of a structured educational package on Kangaroo Mother Care (KMC) in reducing the risk of postnatal depression among mothers of babies admitted to the NICU. The study comprised an intervention group that received the structured educational package and a comparison group that received routine NICU care.

Study Setting:
The study was conducted in the Neonatal Intensive Care Unit (NICU) and the postnatal follow-up clinic of a selected tertiary care hospital in Indore, Madhya Pradesh, India. The hospital caters to a large obstetric population and has a well-established Level II/III NICU, making it an appropriate setting for the proposed intervention.

Sample Size and Sampling Technique:
A total sample of **100 mothers** was included in the study, with **50 mothers in the intervention group** and **50 mothers in the comparison group**. Consecutive sampling was used to recruit eligible mothers as they became available during the data collection period. To minimize contamination and maintain feasibility in a busy clinical environment, **alternate-week allocation** was used: during one week, eligible mothers were assigned to the intervention group, and during the following week, eligible mothers were assigned to the comparison group.

Inclusion criteria:

- Mothers aged ≥18 years; primary caregivers of neonates admitted to NICU.
- Able to read/speak Hindi or English.
- Infant clinically stable enough to permit KMC per treating team.

Exclusion criteria:

- Mothers with known major psychiatric illness requiring ongoing psychiatric care.
- Mothers whose infants were expected to be transferred out of area or whose infants died prior to baseline assessment.

Intervention: Structured Educational Package on KMC developed by investigators and validated by 3 neonatal nursing experts. Components:

1. One-to-one counselling (20 minutes) covering benefits, indications, precautions.
2. Demonstration and supervised first KMC session (skin-to-skin technique).
3. 12-minute video in Hindi with subtitles (KMC steps + maternal testimonials).
4. Printed leaflet (simple language, pictorial steps).
5. One reinforcement visit before hospital discharge and telephone follow-up at 2 weeks.

Comparison: Routine NICU care (standard breastfeeding counselling and ad-hoc nursing support).

Data collection tools:

- Demographic & obstetric proforma.
- **Edinburgh Postnatal Depression Scale (EPDS)** — validated 10-item screening tool; cut-off ≥13 indicates risk for PND.
- KMC Knowledge Questionnaire (10 multiple choice items; score 0–10).
- Self-reported KMC practice diary (hours/day in the first 6 weeks).

Procedure: Baseline EPDS and knowledge assessed during NICU stay prior to intervention. Intervention delivered to the intervention group within 48 hours of enrolment. Posttest EPDS, knowledge and KMC practice assessed at 6 weeks postpartum in clinic or by telephone if unable to attend.

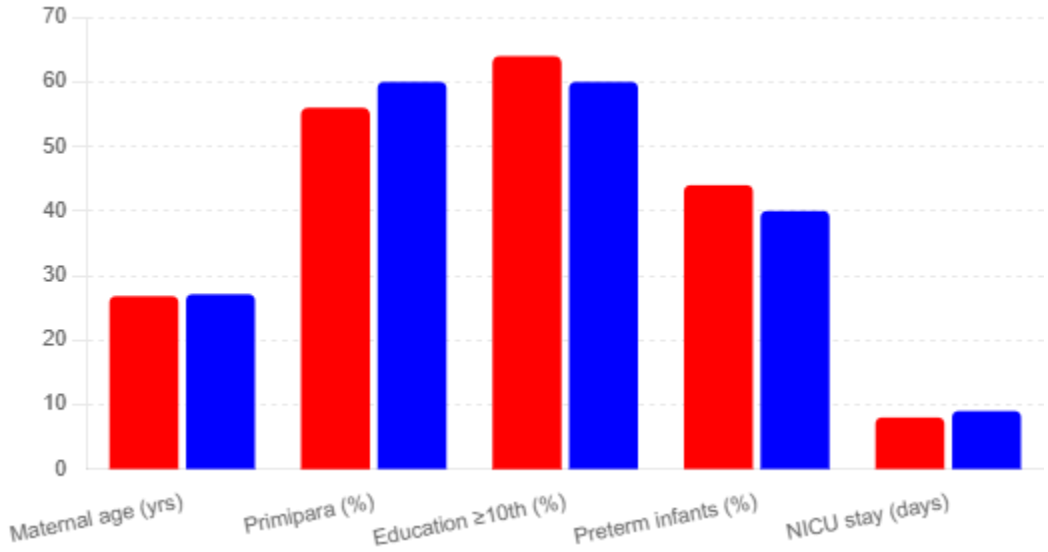
Ethical considerations: Approved by Institutional Ethics Committee; written informed consent obtained; confidentiality ensured.

Statistical analysis: Data analysed with SPSS v26. Continuous variables summarised with mean ± SD; categorical variables as frequencies and percentages. Paired t-test compared within-group pre/post EPDS; independent t-test compared mean changes between groups. Chi-square tested proportions at risk. Multivariable logistic regression adjusted for age, parity, education, infant gestational age and length of NICU stay. Significance set at $p < 0.05$.

RESULTS

Baseline characteristics (Table 1) — groups were comparable on age, parity, education, socio-economic status and infant clinical variables.

Table 1. Baseline characteristics of participants (n = 100) **Variable**	**Intervention (n=50)**	**Comparison (n=50)**	**p-value**
Maternal age, mean ± SD (yrs)	26.8 ± 4.2	27.1 ± 4.7	0.68
Primipara, n (%)	28 (56%)	30 (60%)	0.68
Education ≥10th grade, n (%)	32 (64%)	30 (60%)	0.68
Infant preterm (<37 wks), n (%)	22 (44%)	20 (40%)	0.68
Median NICU stay, days (IQR)	8 (5–12)	9 (6–13)	0.45



Knowledge and KMC practice

Baseline mean KMC knowledge scores were similar (Intervention 4.6 ±1.8 vs Comparison 4.8 ±1.7; p = 0.52). At 6 weeks, mean knowledge improved significantly in the intervention group (8.7 ±1.1) compared with the comparison group (5.6 ±1.9), p < 0.001. Self-reported KMC practice (mean daily hours during first 2 weeks) was higher in intervention mothers (4.2 ±1.6 hrs/day) vs comparison (1.6 ±1.1 hrs/day), p < 0.001.

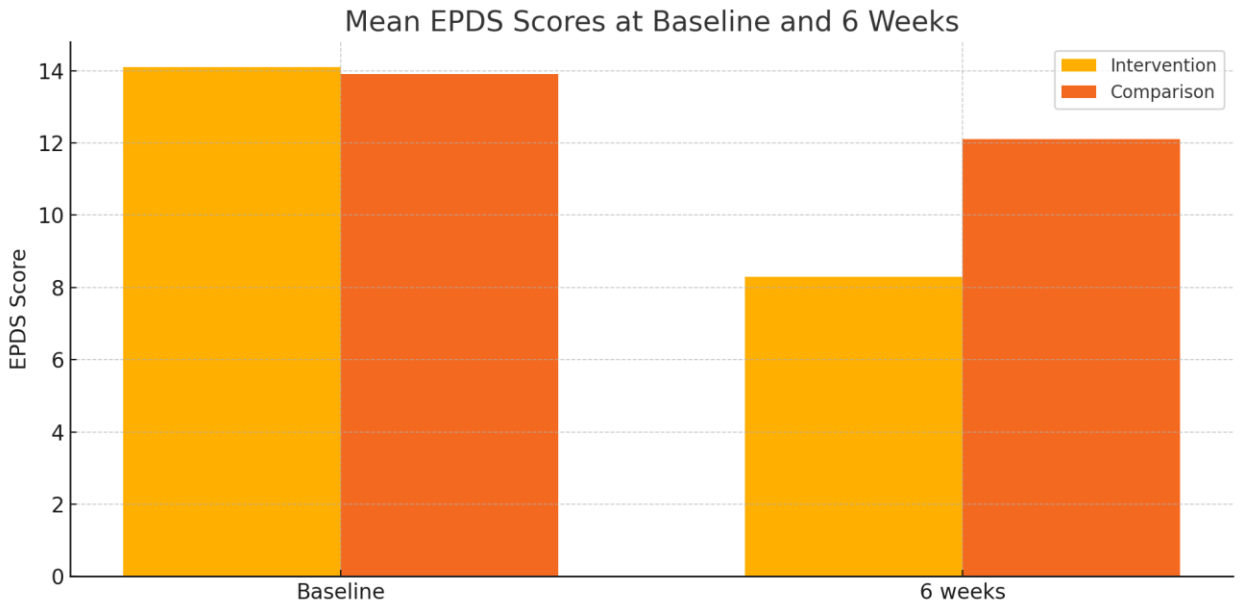
EPDS outcomes

- **Baseline (during NICU):** mean EPDS intervention 14.1 ±2.7; comparison 13.9 ±2.9 (p = 0.72). Proportion at risk (EPDS ≥13): intervention 62% (31/50); comparison 58% (29/50); p = 0.67.
- **At 6 weeks:** mean EPDS intervention 8.3 ±2.2; comparison 12.1 ±2.6 (between-group p < 0.001). Proportion at risk: intervention 18% (9/50); comparison 54% (27/50); $\chi^2 = 15.6$, p < 0.001.
- **Within-group change:** Intervention group mean reduction −5.8 (95% CI −6.6 to −5.0), p < 0.001; Comparison group mean reduction −1.8 (95% CI −2.6 to −1.0), p < 0.01.

Adjusted analysis: Logistic regression controlling for maternal age, parity, education, infant prematurity and NICU length of stay showed participation in the intervention remained significantly associated with lower odds of being at risk for PND at 6 weeks (AOR = 0.21; 95% CI 0.08–0.57; p = 0.002).

EPDS Outcomes

Outcome	Intervention (n=50)	Comparison (n=50)
Baseline EPDS (mean ± SD)	14.1 ± 2.7	13.9 ± 2.9
6-week EPDS (mean ± SD)	8.3 ± 2.2	12.1 ± 2.6
Proportion at risk baseline (%)	62% (31/50)	58% (29/50)
Proportion at risk 6 weeks (%)	18% (9/50)	54% (27/50)
Mean reduction EPDS	−5.8	−1.8
Adjusted Odds Ratio (AOR)	**0.21 (95% CI 0.08–0.57)**	Reference



DISCUSSION

This quasi-experimental study found that a structured educational package on KMC significantly reduced maternal depressive symptoms at 6 weeks postpartum among mothers of NICU-admitted infants. The magnitude of change in EPDS score and the reduction in proportion at risk were clinically relevant. Improved knowledge and greater KMC practice mediated enhanced maternal confidence and bonding, plausibly leading to better psychological outcomes. These findings support integrating structured, nurse-led KMC education into routine NICU care to buffer stress and reduce PND risk.

Limitations: Non-randomized allocation may introduce selection bias; reliance on self-reported KMC practice; single-center study limits generalisability. Future randomized controlled trials and longer follow-up are recommended.

CONCLUSION

A nurse-delivered structured educational package on Kangaroo Mother Care significantly reduces the risk of postnatal depression among mothers of NICU-admitted infants. Implementation of structured KMC education and follow-up should be considered standard NICU practice to support maternal mental health.

IMPLICATIONS FOR PRACTICE

- Incorporate structured KMC education (demonstration + audiovisual + printed materials) into NICU discharge planning.
- Train NICU nursing staff in standardized KMC counselling and follow-up calls.
- Screen NICU mothers with EPDS and provide targeted psychosocial support to high-risk mothers.

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