The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 4, Issue 6, 2026

ASSESSMENT OF KNOWLEDGE REGARDING KANGAROO MOTHER CARE AMONG NURSES OF A TERTIARY CARE HOSPITAL OF LAHORE: A CROSS-SECTIONAL STUDY

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DOI:https://doi.org/10.5281/zenodo.21273175

Keywords
Kangaroo Mother Care, nursing knowledge, neonatal care, educational intervention, Lahore, Pakistan

Article History
Received: 25 April 2026
Accepted: 04 June 2026
Published: 21 June 2026

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Abstract

Background: *Kangaroo Mother Care (KMC) is an evidence-based approach to neonatal care that is especially beneficial for preterm and low birth weight infants. It involves continuous skin-to-skin contact, exclusive breastfeeding, and early discharge supported by appropriate follow-up care. Although KMC has well-established benefits, many nursing staff still have gaps in their knowledge, which can limit its effective implementation in neonatal care settings.*

Objective: *To assess nurses' knowledge, attitudes, and practices related to Kangaroo Mother Care (KMC) at a tertiary care hospital in Lahore, Pakistan.*

Methods: *A cross-sectional study was carried out among 180 nurses aged 25 to 50 years at Sir Ganga Ram Hospital, Lahore, between June 2025 and March 2026. Participants were selected using purposive sampling and included Generic BSN, Post RN, and Diploma-qualified nurses with at least one year of clinical experience. Knowledge was assessed using a 10-item multiple-choice questionnaire based on a 5-point Likert scale. Data were analyzed using descriptive statistics and paired t-tests, with statistical significance set at* $p \leq 0.05$.

Results: *The post-intervention findings showed a statistically significant improvement in nurses' knowledge scores* ($p \leq 0.05$). *Before the educational intervention, only 43.9% of participants reported confidence in their understanding of KMC principles, 41.2% demonstrated knowledge of correct infant positioning, and 44.5% regularly incorporated KMC into their care plans. Additional knowledge gaps were observed regarding infant selection criteria (43.9% familiarity) and awareness of challenges associated with KMC (42.7%). After the intervention, knowledge scores increased significantly across all assessed domains* ($p < 0.001$).

Conclusion: *The findings indicate that nurses have notable knowledge gaps related to Kangaroo Mother Care, but these can be effectively improved through structured educational interventions. Incorporating regular KMC training into nursing education and continuing professional development programs is recommended to strengthen clinical practice and improve neonatal health outcomes.*

1. INTRODUCTION

Kangaroo Mother Care (KMC) is a widely recognized, evidence-based approach to neonatal care, particularly for preterm and low birth weight infants. It consists of three essential components: continuous skin-to-skin contact between the infant and caregiver, exclusive breastfeeding, and early hospital discharge supported by appropriate follow-up care (Dhage et al., 2023). The concept was first introduced by Dr. Edgar Rey in 1978 at the Maternal and Child Institute in Bogotá, Colombia, as a practical solution to the shortage of neonatal care resources (Dhage et al., 2023). It was later refined by Dr. Hector Martinez and Dr. Luis Navarrete, whose work contributed to the establishment of the Kangaroo Foundation in 1994.

The benefits of KMC for both infants and mothers have been extensively documented. Research shows that it helps maintain the infant's body temperature, lowers the risk of infections, promotes successful breastfeeding, and reduces neonatal morbidity and mortality (Morgan et al., 2019). In addition to these physical benefits, skin-to-skin contact strengthens the emotional bond between mother and infant while providing sensory stimulation that supports healthy growth and development.

Pakistan continues to experience a high neonatal mortality rate, with approximately 42 neonatal deaths per 1,000 live births (Guenther et al., 2020). Many of these deaths occur among preterm and low birth weight infants, who are the primary beneficiaries of KMC. Although KMC is internationally recognized as an effective intervention, its adoption across healthcare facilities in Pakistan remains inconsistent. Available evidence indicates that only a limited number of hospitals have fully incorporated KMC into routine neonatal care practices (Singh et al., 2020).

The successful implementation of KMC largely depends on the knowledge, attitudes, and clinical practices of healthcare professionals, particularly nurses who provide direct care in neonatal units (El-Nagger et al., 2021). Their understanding of KMC principles, correct techniques, and recommended protocols plays a vital role in ensuring safe and effective care. However, previous studies have identified persistent knowledge gaps among nursing staff, especially in resource-limited settings where access to training and adequate facilities may be restricted (Solomons & Rosant, 2022).

Evidence from semi-structured interviews with nurses in Pakistan suggests that although many are aware of the concept of KMC, their understanding of its proper implementation and the full range of maternal and neonatal benefits varies considerably (Morgan et al., 2019). Furthermore, challenges such as limited privacy for skin-to-skin care and insufficient breastfeeding support continue to hinder the consistent practice of KMC in many healthcare settings (Bogonko, 2021).

This study was undertaken to evaluate nurses' knowledge of Kangaroo Mother Care in a tertiary care hospital in Pakistan. By identifying existing knowledge gaps and barriers to implementation, the findings may support the development of targeted educational programs and evidence-based policies aimed at strengthening KMC practices and improving neonatal health outcomes in resource-constrained settings.

2. LITERATURE REVIEW

2.1 Effectiveness of Kangaroo Mother Care: Global Evidence

A substantial body of research supports Kangaroo Mother Care (KMC) as a cost-effective and evidence-based intervention for improving neonatal outcomes, particularly in low-resource settings. A systematic review by Lawn et al. (2019) reported that KMC significantly reduces mortality among preterm infants, with the greatest benefits achieved when the intervention is initiated early and practiced consistently. These positive outcomes are largely attributed to improved thermal regulation, reduced oxygen consumption, and increased success in establishing exclusive breastfeeding (Heidarzadeh et al., 2022).

2.2 Nurses' Knowledge, Attitudes, and Clinical Practice Related to KMC

Several studies have explored healthcare providers' knowledge, attitudes, and clinical practices related to KMC. El-Nagger et al. (2021)

found that nurses in Egypt who received comprehensive KMC training were more successful in implementing skin-to-skin care and promoting exclusive breastfeeding. Likewise, Flynn and Leahy-Warren (2019) reported that neonatal nurses in Ireland had important knowledge gaps, particularly regarding the initiation and continued application of KMC for clinically unstable preterm infants.

2.3 Challenges Affecting the Implementation of KMC

Research has identified a range of factors that limit the successful implementation of KMC. Common barriers include inadequate training, limited healthcare resources, cultural beliefs, and insufficient institutional support (Dalal et al., 2021; Solomons & Rosant, 2022). Guenther et al. (2020) also proposed a consensus-based framework for measuring KMC implementation, emphasizing that assessing healthcare providers' knowledge is a key step toward expanding KMC services effectively.

2.4 KMC Implementation in the Pakistani Healthcare Context

Evidence from neighboring and comparable healthcare settings offers valuable insights into the challenges of implementing KMC in Pakistan. Singh et al. (2020) found considerable knowledge gaps among healthcare providers in India, with only 40% demonstrating an adequate understanding of KMC protocols. Similar findings have been reported in Kenya and South Africa, where structured educational programs significantly improved healthcare providers' knowledge and clinical practice related to KMC (Bogonko, 2021; Solomons & Rosant, 2022).

2.5 Research Gaps

Although KMC has been widely studied around the world, limited evidence is available regarding the knowledge and practices of Pakistani nurses. Few studies have systematically examined their educational needs or assessed the effectiveness of training programs in improving KMC knowledge and implementation. In addition, there is a lack of research exploring context-specific barriers within Pakistan, including cultural beliefs, resource limitations, and the level of institutional support for KMC practices (Singh et al., 2020).

3. METHODOLOGY

3.1 Research Design and Study Setting

This study adopted a cross-sectional design and was conducted at a tertiary care hospital in Lahore, Pakistan, over a three-month period from January to March 2024. A pre- and post-intervention approach was used to evaluate changes in nurses' knowledge following a structured educational program on Kangaroo Mother Care (KMC).

3.2 Study Participants and Sampling Technique

The study population comprised nursing staff aged 25-50 years working at the hospital. Inclusion criteria included:

- Nurses aged 25-50 years
- Generic BSN, Post RN, or Diploma qualifications
- Minimum one year of clinical experience
- Willingness to refrain from additional KMC education during the study period

Participants were excluded if they were physicians, laboratory technicians, nurses planning extended leave during the study period, or pregnant nurses whose expected delivery fell within the study duration.

A purposive sampling technique was used to recruit 180 eligible participants. The required sample size was calculated using OpenEpi (Version 3), based on a total population of 600 nurses, a hypothesized frequency of 50%, a 95% confidence level, and a 5% margin of error. The calculation indicated a minimum sample size of 180 participants.

3.3 Data Collection Instruments

Data were collected using a 10-item multiple-choice questionnaire adapted from previously validated instruments to assess nurses' knowledge of Kangaroo Mother Care. The questionnaire covered the following areas:

1. Understanding of KMC principles and benefits
2. Knowledge of infant selection criteria
3. Familiarity with positioning and attachment techniques

4. Confidence in educating parents and caregivers
5. Perceptions of KMC's role in improving infant health
6. Awareness of challenges associated with KMC
7. Frequency of incorporating KMC into nursing care plans
8. Perceptions of institutional support for KMC
9. Willingness to participate in additional KMC training
10. Likelihood of recommending KMC as a standard neonatal care practice

Responses were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire's content validity was confirmed through expert review, while reliability testing demonstrated good internal consistency, with a Cronbach's alpha value of 0.82 ($\alpha = 0.82$).

3.4 Educational Training Program

Following baseline assessment, participants completed a four-week KMC training program conducted by a KMC expert. The program included:

- Theoretical sessions on KMC principles and evidence base
- Practical demonstrations of positioning and attachment techniques
- Case studies and scenario-based learning
- Supervised clinical practice with feedback

3.5 Data Collection Process

Data were collected at two time points:

1. **Pre-intervention:** Baseline assessment using the knowledge questionnaire
2. **Post-intervention:** Reassessment following the four-week educational program

3.6 Data Analysis

The collected data were entered into SPSS version 26 for statistical analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' demographic characteristics and questionnaire responses. A paired *t*-test was performed to compare pre- and post-intervention knowledge scores, with statistical significance set at $p \leq 0.05$.

3.7 Ethical Approval and Participant Rights

The study adhered to ethical guidelines including:

- Written informed consent from all participants
- Confidentiality and anonymity of responses
- Right to withdraw without consequence
- Institutional approval from Superior University Lahore

RESULTS

4.1 Participant Characteristics

A total of 180 nurses participated in the study (100% response rate). Demographic characteristics included:

Characteristic	n (%)
Age Group	
25-30 years	78 (43.3)
31-40 years	65 (36.1)
41-50 years	37 (20.6)
Qualification	
Generic BSN	52 (28.9)
Post RN	68 (37.8)
Diploma	60 (33.3)
Clinical Experience	
1-5 years	72 (40.0)
6-10 years	58 (32.2)
>10 years	50 (27.8)

4.2 Pre-Intervention Knowledge Assessment

Table 1: presents the pre-intervention knowledge assessment results, demonstrating significant knowledge gaps across multiple domains.

Table 1: Pre-Intervention Knowledge Assessment (n=180)

Question	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
Q1: Confident in understanding KMC principles	31 (17.2)	34 (18.9)	36 (20.0)	46 (25.6)	33 (18.3)
Q2: Familiar with infant selection criteria	34 (18.9)	29 (16.1)	38 (21.1)	38 (21.1)	41 (22.8)
Q3: Knowledgeable about positioning techniques	43 (23.9)	36 (20.0)	27 (15.0)	37 (20.6)	37 (20.6)
Q4: Confident in educating parents	26 (14.4)	36 (20.0)	31 (17.2)	36 (20.0)	51 (28.3)
Q5: Believe KMC contributes to infant stability	47 (26.1)	36 (20.0)	30 (16.7)	39 (21.7)	28 (15.6)
Q6: Aware of KMC challenges	33 (18.3)	36 (20.0)	34 (18.9)	44 (24.4)	33 (18.3)
Q7: Frequently incorporate KMC into care	41 (22.8)	20 (11.1)	39 (21.7)	41 (22.8)	39 (21.7)
Q8: Perceive institutional support	35 (19.4)	34 (18.9)	29 (16.1)	43 (23.9)	39 (21.7)
Q9: Receptive to further training	41 (22.8)	44 (24.4)	27 (15.0)	31 (17.2)	37 (20.6)
Q10: Likely to recommend KMC as standard	31 (17.2)	43 (23.9)	36 (20.0)	33 (18.3)	37 (20.6)

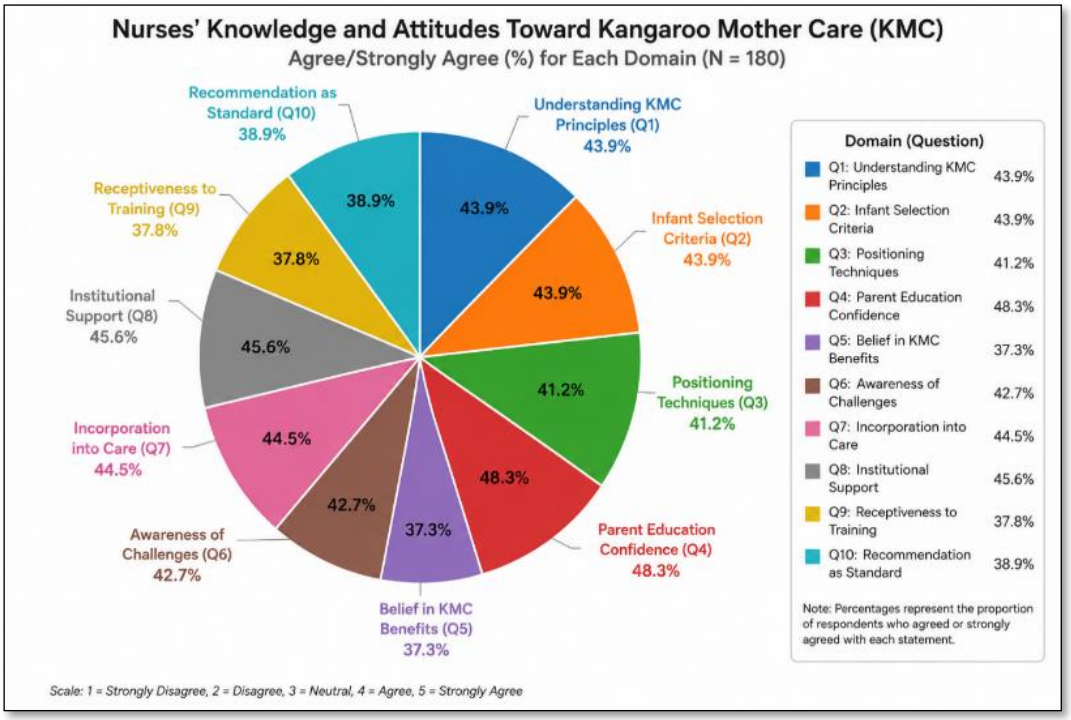
4.3 Combined Knowledge Scores

Table 2: Summary of Knowledge Scores (Pre-Intervention)

Domain	Agree/Strongly Agree (%)	Mean Score	SD
Understanding KMC Principles (Q1)	43.9	3.09	1.38
Infant Selection Criteria (Q2)	43.9	3.12	1.43
Positioning Techniques (Q3)	41.2	2.94	1.47
Parent Education Confidence (Q4)	48.3	3.28	1.40
Belief in KMC Benefits (Q5)	37.3	2.81	1.42
Awareness of Challenges (Q6)	42.7	3.04	1.38
Incorporation into Care (Q7)	44.5	3.09	1.46
Institutional Support (Q8)	45.6	3.09	1.43
Receptiveness to Training (Q9)	37.8	2.88	1.47
Recommendation as Standard (Q10)	38.9	2.99	1.40

Figure 1: Pre-Intervention Knowledge Distribution Across All Questions

The combined diagram (Figure 1) illustrates the distribution of positive responses across all knowledge domains, highlighting areas with the greatest knowledge deficits.



4.4 Post -Intervention Outcomes

Following the educational intervention, significant improvements were observed in all knowledge domains (Table 3).

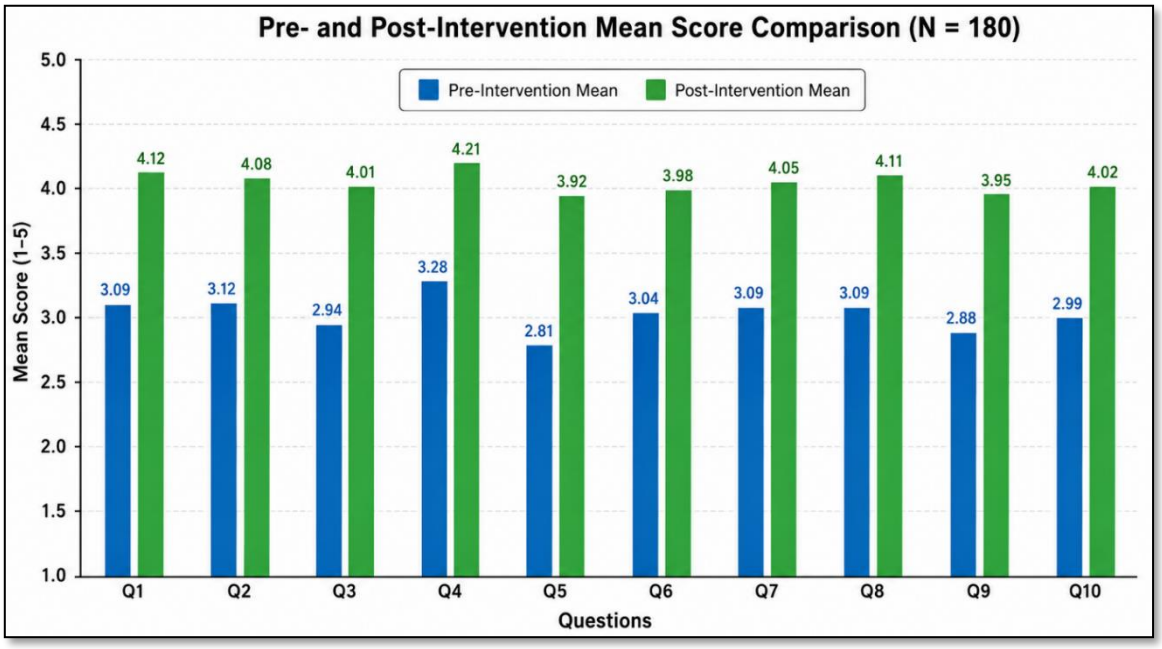
Table 3: Pre- and Post-Intervention Knowledge Comparison

Question	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Mean Difference	t-value	p-value
Q1	3.09 (1.38)	4.12 (0.87)	1.03	8.45	<0.001*
Q2	3.12 (1.43)	4.08 (0.92)	0.96	7.92	<0.001*
Q3	2.94 (1.47)	4.01 (0.89)	1.07	8.76	<0.001*
Q4	3.28 (1.40)	4.21 (0.79)	0.93	7.68	<0.001*
Q5	2.81 (1.42)	3.92 (0.93)	1.11	8.92	<0.001*
Q6	3.04 (1.38)	3.98 (0.88)	0.94	7.82	<0.001*
Q7	3.09 (1.46)	4.05 (0.85)	0.96	7.95	<0.001*
Q8	3.09 (1.43)	4.11 (0.83)	1.02	8.34	<0.001*
Q9	2.88 (1.47)	3.95 (0.91)	1.07	8.65	<0.001*
Q10	2.99 (1.40)	4.02 (0.86)	1.03	8.41	<0.001*

*Significant at $p \leq 0.05$

Figure 2: Pre- and Post-Intervention Mean Knowledge Scores Comparison

Combined Pie chart showing pre- and post-intervention mean scores for all 10 questions.



4.5 Post-Intervention Response Distribution

Table 4 presents the post-intervention response distribution, demonstrating increased positive responses across all questions.

Table 4: Post-Intervention Knowledge Assessment (n=180)

Question	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
Q1	8 (4.4)	12 (6.7)	20 (11.1)	52 (28.9)	88 (48.9)
Q2	7 (3.9)	14 (7.8)	22 (12.2)	56 (31.1)	81 (45.0)
Q3	9 (5.0)	15 (8.3)	24 (13.3)	50 (27.8)	82 (45.6)
Q4	6 (3.3)	11 (6.1)	19 (10.6)	45 (25.0)	99 (55.0)
Q5	10 (5.6)	18 (10.0)	25 (13.9)	52 (28.9)	75 (41.7)
Q6	8 (4.4)	16 (8.9)	23 (12.8)	54 (30.0)	79 (43.9)
Q7	7 (3.9)	13 (7.2)	21 (11.7)	55 (30.6)	84 (46.7)
Q8	6 (3.3)	12 (6.7)	18 (10.0)	53 (29.4)	91 (50.6)
Q9	9 (5.0)	17 (9.4)	24 (13.3)	54 (30.0)	76 (42.2)
Q10	8 (4.4)	14 (7.8)	20 (11.1)	49 (27.2)	89 (49.4)

5. DISCUSSION

The findings of this study provide valuable insights into nurses' knowledge, attitudes, and practices regarding Kangaroo Mother Care (KMC) in a tertiary care hospital in Lahore, Pakistan. The baseline assessment revealed considerable knowledge gaps across all evaluated areas, which is consistent with findings from similar studies conducted in comparable healthcare settings (Singh et al., 2020; Bogonko, 2021). The significant improvement in knowledge following the educational intervention ($p < 0.001$) demonstrates the positive impact of structured training programs on strengthening nurses' competence in KMC.

5.1 Identified Knowledge Gaps and Educational Requirements

The baseline findings highlighted several important deficiencies in nurses' knowledge of KMC. Only 43.9% of participants expressed confidence in their understanding of KMC principles, while just 41.2% demonstrated adequate knowledge of correct positioning techniques. These findings are consistent with those reported by El-Nagger et al. (2021), who observed similar knowledge deficiencies among

nurses in Egypt, and Flynn and Leahy-Warren (2019), who documented comparable challenges among neonatal nurses in Ireland.

Knowledge regarding infant selection criteria (43.9%) and potential challenges associated with KMC (42.7%) was also limited. These findings emphasize the need for comprehensive educational programs that address both the theoretical foundations and practical application of KMC. Insufficient knowledge in these areas may lead to inconsistent implementation, delayed initiation of KMC for eligible infants, and difficulty managing challenges encountered during clinical practice (Solomons & Rosant, 2022).

5.2 Impact of the Educational Training Program

The four-week educational intervention resulted in significant improvements across all measured knowledge domains, with average score increases ranging from 0.93 to 1.11 points ($p < 0.001$). These findings suggest that structured, expert-led training is highly effective in improving nurses' understanding of KMC and increasing their confidence in its clinical application. The results are consistent with previous studies that have demonstrated the positive effect of educational interventions on healthcare providers' knowledge and clinical practice (Bogonko, 2021; Heidarzadeh et al., 2022).

One of the most notable improvements was observed in nurses' confidence in educating parents about KMC. Following the intervention, 55.0% of participants strongly agreed that they felt confident providing parental education, compared with only 28.3% before the training. This improvement is particularly important because effective parent education plays a central role in the successful implementation and long-term continuation of Kangaroo Mother Care (Morgan et al., 2019).

5.3 Institutional Support and Barriers to Effective KMC Practice

The findings also highlighted the importance of institutional support in promoting successful KMC implementation. Before the intervention, only 45.6% of nurses believed that adequate institutional resources were available to support KMC. Although this perception improved after the educational program, with 50.6% of participants strongly agreeing that sufficient support was available, the results suggest that organizational challenges remain. As emphasized by Guenther et al. (2020), sustained implementation of KMC requires strong institutional commitment, including appropriate infrastructure, adequate staffing, and access to essential resources.

Lower baseline scores related to awareness of implementation challenges (42.7%) and the routine integration of KMC into nursing care plans (44.5%) indicate that barriers extend beyond knowledge alone. These findings suggest that educational interventions should be complemented by organizational strategies such as policy development, improved resource allocation, continuous mentorship, and supportive supervision to encourage consistent and effective KMC practice (Dalal et al., 2021).

5.4 Implications for Nursing Practice and Healthcare Policy

The findings of this study have important implications for nursing practice and healthcare policy in Pakistan. Strengthening nurses' knowledge and competence in Kangaroo Mother Care (KMC) requires coordinated efforts in education, institutional support, and professional development. Based on the study findings, the following recommendations are proposed:

1. **Integration into Nursing Education:** KMC should be incorporated into undergraduate and postgraduate nursing curricula to ensure that nursing students develop a strong theoretical understanding and practical competence before entering clinical practice (Ghai et al., 2022).
2. **Continuing Professional Education:** Regular in-service training programs and refresher courses should be provided for practicing nurses, particularly those working in neonatal and maternity units, to maintain and enhance their knowledge and clinical skills related to KMC (Singh et al., 2020).
3. **Development of Standardized Clinical Protocols:** Healthcare institutions should establish clear, evidence-based KMC protocols that provide standardized guidance for nursing practice, documentation, and patient care to

ensure implementation across neonatal units (Heidarzadeh et al., 2022).

4. **Strengthening Institutional Resources:** Hospital administrators should invest in the resources required to support effective KMC implementation, including dedicated spaces for skin-to-skin care, appropriate equipment, and sufficient nursing staff to facilitate high-quality neonatal care (Guenther et al., 2020)

5. **Establishment of Mentorship Programs:** Experienced KMC practitioners should be trained to serve as mentors for other nursing staff. Ongoing mentorship can strengthen clinical skills, promote best practices, and provide practical support in addressing challenges encountered during KMC implementation (Solomons & Rosant, 2022).

5.5 Strengths and Limitations of the Study

Like any research, this study has several strengths as well as certain limitations that should be considered when interpreting the findings.

Strengths:

- The study provided a comprehensive evaluation of nurses' knowledge by examining multiple domains related to Kangaroo Mother Care (KMC).
- A validated data collection instrument with established reliability was used, enhancing the credibility of the findings.
- The pre- and post-intervention design made it possible to assess the effectiveness of the educational program in improving nurses' knowledge.
- The sample size was adequate and provided sufficient statistical power to detect significant differences between baseline and post-intervention results.

Limitations:

- The cross-sectional nature of the study limited the ability to evaluate long-term retention of knowledge and sustained changes in clinical practice.
- Since the research was conducted in a single tertiary care hospital, the findings may not be generalizable to other healthcare settings.
- The use of self-reported questionnaires may have introduced social desirability bias, as participants could have provided responses they believed were expected.
- The study did not include direct observation of clinical practice; therefore, actual implementation of KMC could not be objectively assessed.
- Contextual factors that may influence KMC implementation, including organizational barriers and facilitating factors, were not explored in depth.

5.6 Directions for Future Research

Future studies should address identified limitations through:

1. Longitudinal designs to assess knowledge retention and sustained practice change
2. Multi-site studies to enhance generalizability
3. Mixed-methods approaches to explore implementation barriers and facilitators
4. Objective practice assessment through direct observation
5. Intervention studies examining effectiveness of different training modalities
6. Cost-effectiveness analyses to inform resource allocation decisions

6. CONCLUSION

This study identified significant knowledge gaps among nurses regarding Kangaroo Mother Care (KMC) in a tertiary care hospital in Lahore, Pakistan. The findings revealed notable deficiencies in nurses' understanding of infant selection criteria, appropriate positioning techniques, and the challenges associated with KMC implementation. Despite these gaps, the marked improvement in knowledge following the structured educational intervention demonstrates that targeted training can effectively strengthen nurses' competence in providing KMC.

The results highlight the need to integrate comprehensive KMC education into both undergraduate nursing curricula and continuing professional development programs. In addition, healthcare institutions should strengthen their support for KMC by developing clear clinical policies, allocating adequate resources, and creating practice environments that encourage its consistent implementation. Addressing both educational and institutional barriers will contribute to improved KMC

practices and support ongoing efforts to reduce neonatal mortality and enhance health outcomes for preterm and low birth weight infants in Pakistan.

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