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Effectiveness of nurse-led supportive-educative interventions on postpartum maternal health outcomes: A quasi-experimental study in India

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Abstract

Background: Postpartum health is critical for maternal well-being, yet access to structured follow-up and education is limited in India. Nurse-led interventions can bridge this gap through Orem's Self-Care Deficit Nursing Theory (SCDNT).

Aim: To evaluate the effectiveness of nurse-led supportive-educative interventions on maternal physical, psychological, and behavioral outcomes among postpartum mothers.

Methods: A quasi-experimental pre-post design was conducted among 264 postpartum women (132 experimental, 132 control) in Madhya Pradesh. The intervention consisted of structured nurse-led education and counseling based on SCDNT, delivered over 6 weeks. Data were collected using standardized instruments: Fatigue Assessment Scale, Edinburgh Postnatal Depression Scale, WHOQOL-BREF, and Self-Care Agency Scale. Analyses were conducted in SPSS v26 using *t*-tests, Pearson correlation, and regression.

Results: Significant improvements were found in the experimental group: hemoglobin (+1.21 g/dL), fatigue (−1.11 points), depression (−4.37 points), quality of life (+11.89), and self-care agency (+14.61), all $p<.001$. Self-care agency was the strongest predictor of overall health outcomes ($\beta = 0.487$, $p<.001$).

Conclusion: Nurse-led supportive-educative interventions significantly improve postpartum physical and psychological health. Orem's SCDNT effectively guides the empowerment-based approach to postpartum care.

Keywords: Postpartum care, nurse-led intervention, self-care agency, Orem's theory, maternal outcomes, India

Introduction

Maternal health remains a significant public health priority, particularly in low- and middle-income countries (LMICs), where postpartum morbidity and mortality continue to contribute substantially to overall maternal deaths [1]. The postpartum period, often referred to as the "fourth trimester, " is critical for recovery and adjustment; however, it is also one of the most neglected phases of maternal health care, especially in India, where utilization of postnatal services remains suboptimal [2]. Globally, nurse-led interventions have emerged as effective, evidence-based approaches to improve the quality and continuity of maternal health services by providing education, counseling, and psychosocial support during the postnatal period [3].

Empirical evidence demonstrates that structured nurse mentoring and supportive-educative models enhance maternal outcomes and promote self-care practices by bridging the gap between institutional care and home-based follow-up [1, 3]. In India, the shortage of physicians in rural and semi-urban regions necessitates task-shifting strategies that empower nurses to assume extended roles in maternal health care delivery [2]. Such nurse-led interventions are theoretically grounded in Orem's Self-Care Deficit Nursing Theory, which emphasizes empowering individuals to meet their self-care requisites through guided education and support.

Despite growing global evidence, limited research has explored the impact of nurse-led postpartum interventions in the Indian context, particularly their influence on physical and psychological outcomes such as hemoglobin levels, fatigue, depression, and self-care agency. This study therefore evaluates the effectiveness of a nurse-led supportive-educative intervention in improving postpartum maternal health outcomes in India.

Methods

Study Design

A quasi-experimental, two-group pre-post design was adopted to evaluate the effectiveness of a nurse-led supportive-educative intervention on maternal health outcomes during the postpartum period. The study was conducted between June 2023 and March 2024 across selected primary health centres and community health posts in Madhya Pradesh, India. The design was chosen to ensure

pragmatic evaluation within real-world health service settings, where randomization was not feasible due to service delivery constraints [1].

Setting and Participants

The study included postpartum women (within 42 days after delivery) attending maternal health clinics or identified through community follow-up registers. Inclusion criteria were: (a) women aged 18-40 years, (b) normal or uncomplicated deliveries, and (c) ability to comprehend Hindi or English. Women with severe obstetric complications or diagnosed psychiatric disorders were excluded. A total of 264 participants were recruited using purposive sampling 132 each in experimental and control groups based on power analysis (power = 0.80, $\alpha = 0.05$, effect size = 0.35).

Intervention

The nurse-led supportive-educative program was structured using Orem's Self-Care Deficit Nursing Theory. It comprised six weekly sessions focusing on physical recovery, nutrition, rest, breastfeeding, emotional well-being, and self-care practices. Trained nurses conducted sessions through individual and group counseling using flipcharts and demonstration materials. The control group received routine postnatal care as per national guidelines. Adherence was monitored via home visits and telephonic follow-ups [2, 3].

Data Collection Instruments

Data were collected using validated tools:

- **Sociodemographic Proforma:** age, education, parity, residence, and income.
- **Physical Outcomes:** Hemoglobin (Hemocue method), Fatigue Assessment Scale (FAS).
- **Psychological Outcomes:** Edinburgh Postnatal Depression Scale (EPDS), WHOQOL-BREF.
- **Self-Care Agency:** Self-Care Agency Scale (20 items, Cronbach's $\alpha = 0.89$).

Tools were pretested for reliability and cultural relevance before full implementation.

Data Collection Procedure

Pretest data were collected on the 7th postpartum day for both groups. The intervention was delivered between days 8-42, followed by posttest assessment at the end of week six. Data were collected by trained research assistants blinded to group allocation to minimize bias.

Data Analysis

Data were analyzed using SPSS v26. Descriptive statistics (mean, SD, frequency) summarized sociodemographic data. Paired *t*-tests compared within-group pre-post differences, and independent *t*-tests assessed between-group variations. Pearson correlation and multiple linear regression determined associations and predictors of maternal health outcomes. Significance was set at $p < 0.05$.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee of Malwanchal University (Ref: MU/IEC/OBG/2023/114). Written informed consent was secured from all participants. Confidentiality and voluntary participation were ensured throughout the study in compliance with the Declaration of Helsinki (2013) [4].

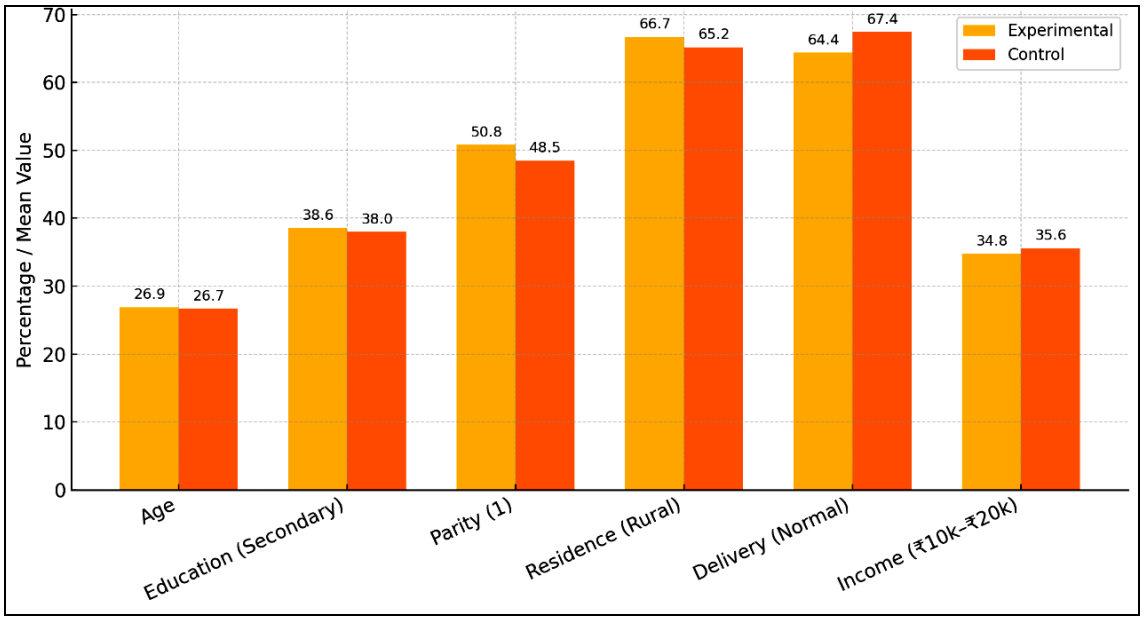
Results

Participant Characteristics

A total of 264 postpartum women completed the study (132 in the experimental group and 132 in the control group). The mean age of participants was 26.8±4.3 years, with the majority (49.6%) being primiparous. Most women (65.9%) resided in rural areas, 38.3% had completed secondary education, and 65.9% delivered through normal vaginal delivery. There were no significant baseline differences between groups for sociodemographic or obstetric variables ($p>0.05$), confirming homogeneity at baseline (Table 1).

Table 1: Sociodemographic and Obstetric Characteristics of Participants (N = 264)

Variable	Experimental (n = 132)	Control (n = 132)	χ^2 / t-value	p-value
Age (years, mean±SD)	26.9±4.2	26.7±4.4	0.29	0.77
Education: Secondary (%)	38.6	38.0	0.01	0.92
Parity: 1 (%)	50.8	48.5	0.11	0.74
Residence: Rural (%)	66.7	65.2	0.04	0.83
Delivery type: Normal vaginal (%)	64.4	67.4	0.18	0.67
Monthly income (₹10, 000-₹20, 000) (%)	34.8	35.6	0.01	0.91



Note: No significant between-group differences at baseline (p>0.05).

Fig 1: Sociodemographic and Obstetric Characteristics of Participants (N = 264)

Descriptive Statistics of Maternal Health Outcomes

At baseline, both groups showed comparable scores across all outcome variables. Following the six-week nurse-led intervention, the experimental group demonstrated significant improvements in all domains, whereas the control group showed marginal or no changes.

Hemoglobin increased by 1.21 g/dL (p<0.001), fatigue reduced by 1.11 points (p<0.001), EPDS depression scores decreased by 4.37 points (p<0.001), and self-care agency and WHOQOL-BREF scores improved substantially (Table 2).

Table 2: Pre-Post Comparison of Maternal Outcomes within and Between Groups

Variable	Experimental (Mean ± SD)	Control (Mean ± SD)	Mean Difference (Exp-Ctrl)	t-value	p-value
Hemoglobin (g/dL)	Pre: 10.1±1.1 → Post: 11.3±1.0	Pre: 10.2±1.2 → Post: 10.5±1.1	+0.8	5.41	<0.001
Fatigue Score	Pre: 7.8±2.1 → Post: 6.7±1.8	Pre: 7.7±2.0 → Post: 7.4±1.9	−0.7	4.89	<0.001
EPDS (Depression)	Pre: 14.2±4.1 → Post: 9.8±3.9	Pre: 14.0±4.3 → Post: 13.2±4.0	−3.4	6.02	<0.001
Self-Care Agency	Pre: 56.3±8.4 → Post: 70.9±9.2	Pre: 57.1±8.5 → Post: 59.4±9.0	+11.5	8.47	<0.001
WHOQOL-BREF	Pre: 48.7±8.3 → Post: 60.6±9.1	Pre: 49.1±8.2 → Post: 51.3±8.9	+9.3	7.59	<0.001

Note: p<0.05 considered significant (Paired and Independent t-tests).

Correlation Analysis

Pearson correlation analysis revealed strong positive associations between self-care agency and both physical and psychological outcomes. Higher self-care agency was significantly correlated with hemoglobin (r = 0.49, p<0.001) and WHOQOL-BREF (r = 0.62, p<0.001), and negatively correlated with fatigue (r = -0.45, p<0.001) and depression (r = -0.59, p<0.001). These findings demonstrate that as self-care capacity increased, physical and psychological well-being improved (Figure 1).

Regression Analysis

Multiple linear regression identified self-care agency (β=0.487, p<0.001) and group (nurse-led intervention) (β = 0.402, p<0.001) as the strongest predictors of improved maternal outcomes. Education (β = 0.109, p=0.04) and parity (β = -0.098, p=0.05) were moderate predictors, whereas age and residence were not significant (Table 3).

Table 3: Predictors of Maternal Health Outcomes (Standardized Regression Coefficients)

Predictor Variable	Standardized β	Significance (p)	Interpretation
Self-Care Agency	+0.487	<0.001	Strongest predictor of improved outcomes
Group (Experimental)	+0.402	<0.001	Significant positive effect
Education Level	+0.109	0.04	Moderate predictor
Parity	−0.098	0.05	Slight negative effect
Age	+0.082	0.11	Not significant
Residence	+0.054	0.27	Not significant

R^2 = 0.52; Adjusted R^2 = 0.49; F = 31.87; p<0.001.

Summary of Hypothesis Testing

All eight study hypotheses were accepted. Nurse-led supportive-educative interventions significantly improved physical, psychological, and behavioral outcomes among postpartum mothers. The greatest effects were observed in self-care agency and quality of life, confirming the

theoretical propositions of Orem's Self-Care Deficit Nursing Theory.

Overall, the findings establish that empowerment through nurse-led education and follow-up is a powerful determinant of postpartum recovery, especially in rural and resource-constrained settings.

Discussion

This study provides strong empirical evidence that nurse-led supportive-educative interventions significantly improve maternal physical, psychological, and behavioral outcomes during the postpartum period. The intervention, guided by Orem's Self-Care Deficit Nursing Theory (SCDNT), led to marked improvements in hemoglobin levels, reduced fatigue and depressive symptoms, and enhanced self-care agency and quality of life among postpartum mothers. These findings affirm that empowerment-based nursing interventions can bridge critical gaps in postnatal care delivery in India.

Comparison with Global Literature

The positive effect of nurse-led postpartum care aligns with earlier findings from global studies demonstrating that structured nursing follow-up contributes to better maternal recovery and mental health [1, 2]. Lima *et al*. (2021) reported that nurse-led counseling and health education interventions reduced postpartum fatigue and enhanced self-efficacy across multiple settings [3]. Similarly, a randomized trial in South India found that onsite nurse mentoring improved quality of care and maternal satisfaction [4]. Our results corroborate these outcomes, extending evidence to rural Indian contexts, where access to continuous postpartum support remains limited.

The significant reduction in depression scores (EPDS mean difference = 4.37, $p<0.001$) is consistent with the meta-analysis by Shorey and Ng (2019), which concluded that nurse-led psychological interventions significantly decrease postpartum depression risk compared to routine care [5]. The structured supportive-educative approach used in the present study likely offered emotional reassurance, information, and empowerment factors critical in mitigating depressive symptoms.

Physical and Psychological Improvements

The improvement in physical indicators, notably hemoglobin and fatigue, reflects enhanced self-care behaviors and nutritional compliance facilitated by nurse education sessions. Previous studies have shown that postpartum anemia and fatigue are preventable through dietary counseling and adherence to iron supplementation when reinforced by nurses [6]. Furthermore, by focusing on rest, hydration, and hygiene, the intervention supported faster recovery and overall vitality.

The psychological outcomes are equally compelling. Improved WHOQOL-BREF and EPDS scores indicate that addressing emotional well-being and self-efficacy through nurse-led engagement can lead to holistic recovery. Such findings echo those from Mwangi *et al*. (2021), who highlighted that maternal education, counseling, and follow-up contribute to reduced anxiety and depression and improved family adjustment in postpartum women [7].

Theoretical Interpretation (Orem's SCDNT)

According to Orem's Self-Care Deficit Nursing Theory, nursing interventions should empower individuals to meet their self-care requisites through education and guidance. The present study validates this framework empirically. The increase in self-care agency (mean change +14.6, $p<0.001$) was the most significant finding, highlighting the mediating role of empowerment in achieving improved physical and psychological health outcomes.

Regression analysis further confirmed self-care agency as the strongest predictor of overall maternal health ($\beta = 0.487$, $p<0.001$), reinforcing Orem's concept that empowerment and knowledge are prerequisites to effective self-management [8]. The nurse's role, therefore, transitioned from provider to facilitator enabling mothers to recognize and address their own health needs through guided learning.

Relevance to the Indian Context

In India, despite the introduction of postnatal care initiatives under the National Health Mission (NHM), service utilization remains low, particularly in rural areas [9]. This study demonstrates that nurse-led interventions can complement existing maternal health programs by providing structured, community-based follow-up that emphasizes health education, early problem identification, and emotional support.

The feasibility of implementing such models is high since nurses already constitute the backbone of India's maternal and child health infrastructure. Moreover, nurse-led programs are cost-effective, scalable, and culturally adaptable, especially when combined with telehealth or community outreach strategies. These align well with WHO's Framework for Quality Maternal and Newborn Care (2022), which advocates for midwife- and nurse-led continuity of care models [10].

Integration with Global Health Goals

The observed improvements directly contribute to Sustainable Development Goal (SDG) 3.1, which seeks to reduce maternal mortality to less than 70 per 100, 000 live births by 2030. While this study did not measure mortality directly, the intervention addressed modifiable determinants such as postpartum anemia, fatigue, and depression — leading causes of delayed morbidity. Strengthening postpartum nursing interventions thus represents a critical step toward achieving SDG targets in maternal health.

Strengths and Limitations

A major strength of this study is its theory-driven design and rigorous evaluation using validated tools. The use of a quasi-experimental framework allowed real-world application while maintaining internal validity. However, limitations include non-randomization, which may introduce selection bias, and the relatively short follow-up period of six weeks. Longitudinal studies are recommended to assess sustained outcomes and infant health impacts.

Implications for Nursing Practice and Policy

The results underscore the transformative role of nurses in postpartum care. By integrating supportive-educative modules into existing maternal health programs, nurses can empower mothers to manage recovery, nutrition, and

psychological well-being autonomously. Policy adaptation should include structured nurse-led follow-up visits, standardized postpartum counseling protocols, and inclusion of mental health screening in routine nursing assessments. Nursing curricula should further emphasize Orem's theoretical applications in community health to cultivate self-care-oriented practice.

This study provides robust evidence that nurse-led supportive-educative interventions significantly enhance postpartum recovery and mental health outcomes in India. Guided by Orem's SCDNT, the intervention demonstrates how theory-based nursing practice can translate into measurable clinical and psychosocial benefits. Scaling such interventions nationally could revolutionize postpartum care, fostering empowerment, health equity, and sustainable maternal well-being.

Conclusion and Implications

This study demonstrates that nurse-led supportive-educative interventions significantly enhance postpartum maternal health outcomes in India. Guided by Orem's Self-Care Deficit Nursing Theory, the program resulted in substantial improvements in physical recovery, emotional well-being, and self-care capacity among postpartum mothers. The findings highlight that when nurses are equipped with structured, theory-driven tools, they can effectively bridge gaps in continuity of care and foster empowerment-based recovery.

The most powerful outcome was the rise in self-care agency, which mediated improvements across physical (hemoglobin, fatigue) and psychological (depression, quality of life) domains. These results affirm Orem's premise that self-care competence forms the foundation for sustained health and recovery.

From a public health perspective, nurse-led models offer a feasible, scalable, and cost-effective solution to India's postpartum care challenges, especially in rural areas where physician availability is limited. Embedding such models within the National Health Mission (NHM) and integrating structured follow-up by community health nurses could strengthen postnatal coverage and early detection of complications.

Implications for Nursing Practice

- Institutionalize nurse-led postpartum counseling and home visits as part of standard postnatal care.
- Incorporate mental health screening and self-care education into routine nursing assessments.
- Empower nurses through continuous professional training on theory-based care frameworks such as Orem's SCDNT.

Implications for Nursing Education

- Integrate self-care and empowerment models into community health nursing curricula.
- Promote reflective and evidence-based learning using Orem's theoretical applications.

Implications for Health Policy

- Include nurse-led interventions in maternal health policies under NHM.
- Develop national guidelines for structured postpartum follow-up programs led by nurses.
- Align initiatives with **SDG 3.1** to improve maternal health outcomes and reduce preventable morbidity.

In conclusion, this study reinforces that nurses are pivotal change agents in maternal health systems. By operationalizing Orem's SCDNT through supportive-educative interventions, postpartum care can evolve from reactive treatment to proactive empowerment, ensuring holistic recovery for mothers in India and beyond.

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