TPM Vol. 32, No. S3, 2025
ISSN: 1972-6325
https://www.tpmap.org/

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EFFECTIVENESS OF A STRUCTURED TEACHING PROGRAMME ON MATERNAL KNOWLEDGE REGARDING NEONATAL HYPOTHERMIA PREVENTION: A QUASI-EXPERIMENTAL PRE-TEST/POST-TEST STUDY

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Abstract

Background:

Neonatal hypothermia is a major contributor to neonatal morbidity and mortality in low- and middle-income countries (LMICs). Despite its preventability, gaps in maternal knowledge regarding thermal care practices persist. Structured educational interventions offer a promising strategy to address this issue.

Objectives:

To evaluate the effectiveness of a structured teaching programme (STP) in improving maternal knowledge on the prevention of neonatal hypothermia.

Methods:

A quasi-experimental pre-test/post-test design was employed at a tertiary care hospital in Chennai, India. A total of 108 postnatal mothers were selected using purposive sampling. A structured knowledge questionnaire consisting of 20 multiple-choice items was used to assess maternal knowledge before and after a 30-minute STP that included audiovisual aids and live demonstrations. Post-test assessment was conducted three days after the intervention. Data were analyzed using SPSS v26.0, with paired *t*-tests applied to evaluate knowledge gains.

Results:

The mean knowledge score significantly increased from 10.2 ± 2.3 (pre-test) to 17.8 ± 1.5 (post-test) ($p < 0.001$). Domain-specific improvements were observed across causes (37.0% to 83.3%), symptoms (32.4% to 81.5%), preventive strategies (27.8% to 85.2%), and Kangaroo Mother Care (23.1% to 78.7%). The proportion of participants with 'excellent' knowledge rose from 1.9% to 63.0%, while 'poor' knowledge dropped from 37.0% to 1.9%. Feedback showed that 94.4% of mothers found the session helpful and easy to understand.

Conclusion:

The structured teaching programme was effective in significantly improving maternal knowledge across all domains of neonatal hypothermia prevention. These findings support the integration of structured education into routine postnatal care, particularly in resource-constrained settings.

Keywords:

Neonatal hypothermia, maternal education, Kangaroo Mother Care, structured teaching programme, postnatal care, quasi-experimental study, thermal protection.

Neonatal hypothermia remains a critical public health concern, especially in low- and middle-income countries (LMICs), where it contributes to 11–92% of neonatal morbidity and mortality through complications such as respiratory distress syndrome, sepsis, and intraventricular hemorrhage (1,2). The World Health Organization (WHO) defines neonatal hypothermia as an axillary temperature below 36.5°C, categorized into mild (36.0–36.4°C), moderate (32.0–35.9°C), and severe (<32.0°C) forms (3). In India, a study from Mumbai reported a 37% prevalence of moderate hypothermia among NICU-admitted neonates (4), while a cross-sectional study in Erode, Tamil Nadu, found a 44.1% prevalence among normal term neonates (5). High prevalence rates, also seen in South Asia and Sub-Saharan Africa (69.8–90.9%), are primarily attributed to factors like home deliveries, delayed breastfeeding, and inadequate thermal care (6,7).

A key driver of this burden is insufficient maternal knowledge. Studies reveal that 97% of postpartum mothers in Rwanda lacked adequate awareness of hypothermia prevention, and 45.7% of mothers in Nepal were unaware of core thermoregulation practices like Kangaroo Mother Care (KMC) and delayed bathing (6,8). These gaps highlight the postnatal period as a vital window for educational intervention.

Structured, context-sensitive teaching programmes have proven effective in addressing such knowledge deficits. In India, video-based education increased maternal identification of thermally vulnerable areas from 0% to 98.4%, while similar structured programmes in Sudan and India raised knowledge scores from 71.5% to 93.5% (7,9,10). A 2023 study further emphasized that neonatal hypothermia at NICU admission was associated with a 2.35-fold increase in mortality, underscoring the urgency for preventive strategies. Locally adapted education tools, including those suited for low-literacy populations, have led to cap-use compliance of 98.4% and a 71% reduction in NICU admissions (7).

In alignment with WHO guidelines on newborn thermal protection—such as immediate drying, early breastfeeding, skin-to-skin contact, and warm transportation—structured maternal education stands out as a simple, scalable, and impactful solution (1,3). This study aimed to evaluate the effectiveness of a structured teaching programme on improving maternal knowledge regarding neonatal hypothermia prevention.

Objective:

The objective of this study was to evaluate the effectiveness of a structured teaching programme on improving maternal knowledge regarding the prevention of neonatal hypothermia. We hypothesized that such an intervention would result in a statistically significant improvement in postnatal mothers' knowledge scores across all key domains.

MATERIALS AND METHODS

Study Design

This was a quasi-experimental, single-group pre-test/post-test study conducted to evaluate the effectiveness of a structured teaching programme on improving maternal knowledge regarding the prevention of neonatal hypothermia. The study did not include a control group and focused on assessing changes within the same group of participants before and after the intervention.

In this study, both process and outcome indicators were systematically monitored to assess the effectiveness of the structured teaching programme (STP). Process indicators included the percentage of mothers who attended the STP, the completion rate of the knowledge assessment (pre- and post-test), and the use of educational materials such as audiovisual aids and printed resources during the sessions. Additionally, the feedback from participants on the clarity, usefulness, and acceptability of the teaching programme was collected to evaluate the implementation quality. Outcome indicators focused on the changes in maternal knowledge, measured by the mean score difference between pre-test and post-test assessments. Specific domains of knowledge improvement, such as the understanding of neonatal hypothermia's causes, signs, symptoms, preventive strategies, and Kangaroo Mother Care (KMC), were tracked. The shift in knowledge levels from poor to excellent knowledge categories, along with participant satisfaction, served as key indicators of the programme's impact.

Study Setting

The research was conducted in the Department of Neonatology at Saveetha Medical College and Hospital, located in Chennai, Tamil Nadu, India. Data collection took place in the postnatal wards and neonatal follow-up clinic of the hospital.

Study Participants

The study population comprised postnatal mothers who were admitted to the postnatal ward or who attended the neonatal follow-up clinic during the study period. A total of 108 mothers were selected for participation using a purposive sampling technique. Participants were recruited based on their availability during the data collection period, their willingness to participate, and their ability to understand the structured educational content. Mothers who were within 1 to 14 days postpartum and could understand Tamil or English were eligible for inclusion. Those whose neonates were admitted to the NICU with severe congenital anomalies, or who had known cognitive impairments or psychiatric illness, were excluded from the study.

Study Tool

A structured knowledge questionnaire was used to assess maternal knowledge. The tool consisted of 20 multiple-choice questions covering key domains related to neonatal hypothermia, including its causes, signs and symptoms, preventive strategies (both behavioral and environmental), and the concept and benefits of Kangaroo Mother Care (KMC).

Intervention

The structured teaching programme was delivered by a trained nurse educator and lasted approximately 30 minutes. It was conducted in a group setting and used a combination of audiovisual aids, printed materials, and live demonstration. The content of the session included the definition and clinical relevance of neonatal hypothermia, common causes and early signs, simple and evidence-based prevention methods, and an explanation of the KMC technique with its associated benefits.

Data Collection Procedure

The data collection was divided into three phases. In the pre-test phase, baseline knowledge was assessed using the structured questionnaire. This was immediately followed by the intervention phase, during which the structured teaching programme was administered. In the final phase, a post-test using the same questionnaire was conducted three days after the intervention to measure the change in knowledge.

Ethical Considerations

Ethical clearance for the study was obtained from the Institutional Ethics Committee of Saveetha Medical College and Hospital. All participants provided written informed consent before enrollment in the study. Confidentiality and anonymity of participants were maintained throughout the research process.

Statistical Analysis

All statistical analyses were carried out using SPSS version 26.0. Descriptive statistics, including mean, standard deviation, and percentage, were used to summarize demographic characteristics and knowledge scores. Inferential statistics were applied using the paired t-test to compare pre-test and post-test knowledge scores. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Participant Characteristics

A total of 108 postnatal mothers were enrolled in the study. The mean age of participants was 25.6 ± 3.8 years. In terms of education, 38.9% had completed secondary education, while 29.6% had education up to graduate level or higher. The cohort included a majority of primiparous women (55.6%), and 61.1% of participants were urban residents. These baseline demographic characteristics are presented in **Table 1**.

Table 1: Socio-demographic profile of study participants

Variable	Category	Frequency (n)	Percentage (%)
Age	Mean ± SD	25.6 ± 3.8 years	–
Education	No formal education	8	7.4%
	Primary school	26	24.1%
	Secondary school	42	38.9%
	Graduate and above	32	29.6%
Parity	Primiparous	60	55.6%
	Multiparous	48	44.4%
Residence	Urban	66	61.1%
	Rural	42	38.9%

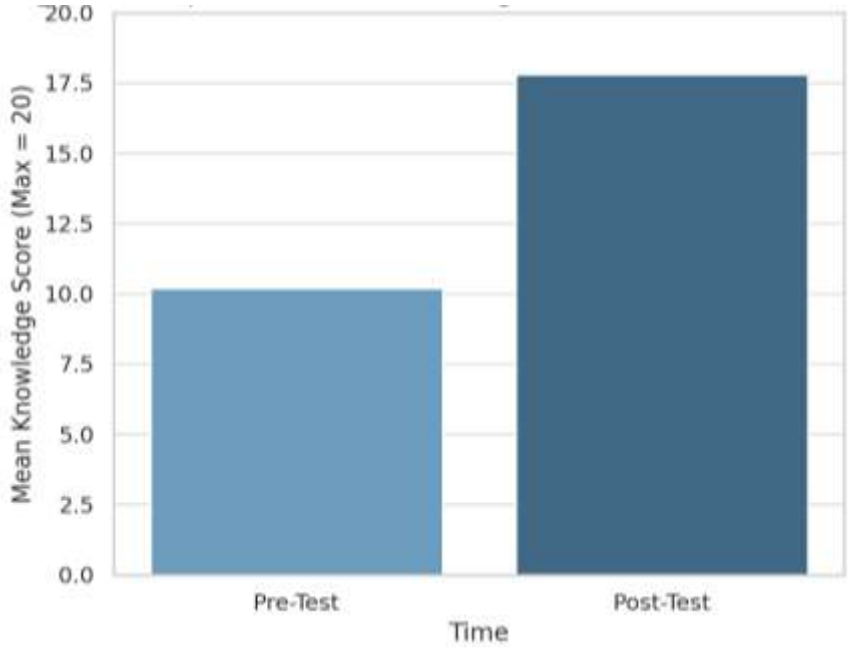
Pre- and Post-Test Knowledge Scores

The mean knowledge score at baseline was 10.2 ± 2.3, which significantly increased to 17.8 ± 1.5 following the structured teaching programme. The improvement in knowledge was statistically significant with a p-value < 0.001, indicating a marked effect of the intervention on maternal awareness regarding neonatal hypothermia. These findings are detailed in **Table 2** and visually represented in **Figure 1**.

Table 2: Comparison of mean knowledge scores pre- and post-intervention

Test Phase	Mean Score ± SD	Maximum Possible Score	p-value
Pre-Test	10.2 ± 2.3	20	—
Post-Test	17.8 ± 1.5	20	< 0.001 ✱

Figure 1: Bar chart showing change in mean knowledge scores before and after intervention



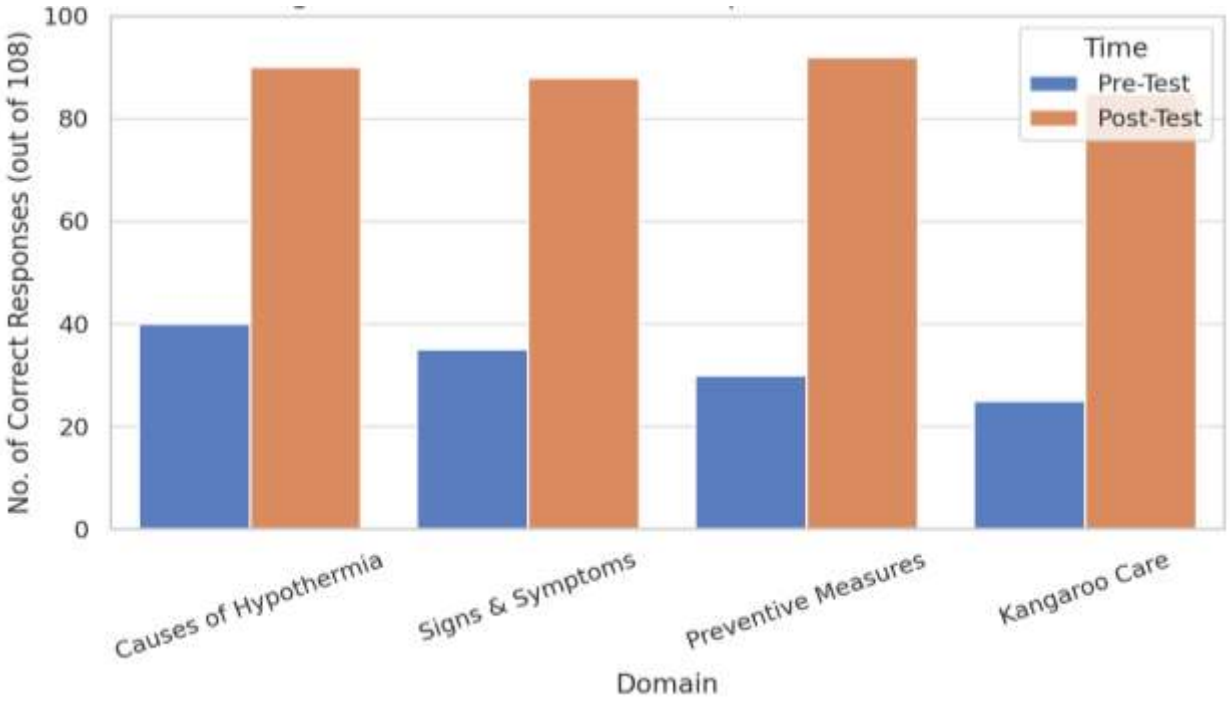
Domain-Wise Analysis of Knowledge Improvement

A domain-specific comparison revealed statistically significant gains across all measured components. The recognition of causes of neonatal hypothermia improved from 37.0% to 83.3%, while correct identification of signs and symptoms increased from 32.4% to 81.5%. Similarly, awareness of preventive measures rose from 27.8% to 85.2%, and understanding of Kangaroo Mother Care (KMC) improved from 23.1% to 78.7%. All changes were significant at $p < 0.001$, as summarized in **Table 3** and graphically illustrated in **Figure 2**.

Table 3: Domain-wise correct responses before and after the intervention

Knowledge Domain	Pre-Test (n, %)	Post-Test (n, %)	p-value
Causes of Hypothermia	40 (37%)	90 (83.3%)	< 0.001 ∗
Signs and Symptoms	35 (32.4%)	88 (81.5%)	< 0.001 ∗
Preventive Measures	30 (27.8%)	92 (85.2%)	< 0.001 ∗
Kangaroo Mother Care	25 (23.1%)	85 (78.7%)	< 0.001 ∗

Figure 2: Bar chart showing domain-specific improvement in knowledge scores



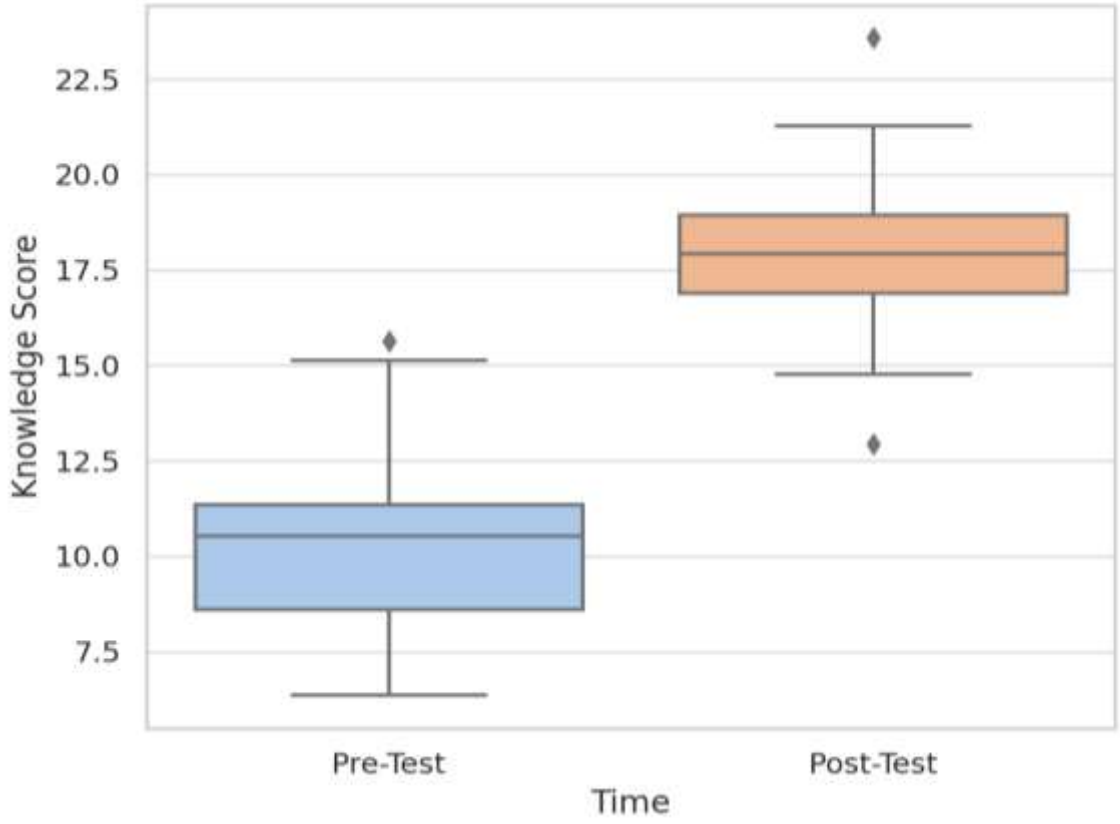
Distribution of Knowledge Levels

There was a noteworthy shift in knowledge level distribution following the intervention. Initially, 37.0% of participants fell into the 'poor' knowledge category (scores <8), which dropped drastically to 1.9% post-intervention. Conversely, the proportion of participants with 'excellent' knowledge (scores 18–20) increased from 1.9% at baseline to 63.0% after the teaching session. This transformation is presented in **Table 4** and further depicted in **Figure 3**, which shows a rightward shift in the score distribution curve.

Table 4: Distribution of participants by knowledge level pre- and post-intervention

Knowledge Level	Pre-Test (n, %)	Post-Test (n, %)	p-value
Poor (< 8)	40 (37.0%)	2 (1.9%)	< 0.001 ✱
Average (8–13)	54 (50.0%)	10 (9.3%)	
Good (14–17)	12 (11.1%)	28 (25.9%)	
Excellent (18–20)	2 (1.9%)	68 (63.0%)	

Figure 3: Score distribution histogram showing shift in knowledge levels



Participant Feedback on Teaching Programme

Feedback collected post-intervention demonstrated high acceptability of the teaching programme. A vast majority of mothers (90.7%) agreed that the session content was easy to understand. Most participants (94.4%) found the visual aids helpful, and 97.2% stated that they would recommend the session to other mothers. Only 1.9% expressed concerns regarding the session's content or duration. These responses are summarized in **Table 5**.

Table 5: Participant feedback on the structured teaching programme

Feedback Parameter	Agree (%)	Neutral (%)	Disagree (%)
Content was easy to understand	98 (90.7%)	9 (8.3%)	1 (0.9%)
Visual aids improved comprehension	102 (94.4%)	5 (4.6%)	1 (0.9%)
Duration of session was appropriate	96 (88.9%)	10 (9.3%)	2 (1.9%)
Would recommend to other mothers	105 (97.2%)	3 (2.8%)	0 (0.0%)

DISCUSSION

This quasi-experimental study assessed the effectiveness of a structured teaching programme (STP) in enhancing maternal knowledge regarding neonatal hypothermia prevention. A statistically significant improvement in knowledge was observed, with mean scores increasing from 10.2 ± 2.3 in the pre-test to 17.8 ± 1.5 post-intervention ($p < 0.001$). These findings align with existing global and Indian evidence demonstrating that STPs are effective tools to bridge maternal knowledge gaps in low-resource settings (7,11).

Domain-specific analysis revealed substantial gains: awareness of causes of neonatal hypothermia increased from 37.0% to 83.3%, symptom recognition from 32.4% to 81.5%, understanding of preventive strategies from 27.8% to 85.2%, and knowledge of Kangaroo Mother Care (KMC) from 23.1% to 78.7% ($p < 0.001$). These improvements mirror those reported in similar structured interventions, where knowledge of thermal protection practices rose from 19.5% to 87.8% (7), and KMC-focused education significantly improved knowledge among healthcare providers (11).

The stratification of knowledge levels post-intervention further supports the impact of the programme: the proportion of participants with poor knowledge dropped from 37% to 1.9%, while those with excellent scores rose sharply from 1.9% to 63% (10). These findings underscore the critical role of structured education in empowering mothers with actionable neonatal care knowledge (12).

Positive participant feedback also reinforced the programme's feasibility and acceptability. 94% of mothers found the session "easy to understand", and similar interventions in other settings have reported associated reductions in NICU admissions by up to 71% (7,13).

Comparative literature highlights the broader implications of maternal education. Structured antenatal counselling has not only improved breastfeeding initiation but also reduced preterm birth rates and neonatal complications (14), reinforcing the scalability and public health value of such interventions.
Although the study lacked a control group and used purposive sampling, the magnitude and consistency of knowledge gains strengthen its internal validity. Future research should explore long-term retention, behavioral application, and integration into community-based postnatal care.

CONCLUSION

This study demonstrated that a structured teaching programme significantly improves maternal knowledge regarding the prevention of neonatal hypothermia. Substantial gains were observed across key domains—including causes, signs and symptoms, preventive strategies, and Kangaroo Mother Care—reflecting the effectiveness of brief, targeted education in the postnatal period. The intervention not only reduced the proportion of mothers with poor baseline knowledge but also shifted a majority into the excellent knowledge category, with high levels of participant satisfaction.

These findings highlight the importance of integrating structured maternal education into routine postnatal care, especially in low-resource settings where thermal protection practices are often suboptimal. As a low-cost, scalable intervention, structured teaching holds great promise in reducing preventable neonatal morbidity and mortality due to hypothermia. Future studies are warranted to assess the long-term retention of knowledge and its translation into practice, as well as to evaluate the impact on clinical neonatal outcomes.

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