To Assess The Effectiveness Of Structured Teaching Programme On Knowledge Regarding Cord Blood Stem Cell Collection And Preservation Among Staff Nurses At A Selected Hospital

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Abstract

Background: Cord blood stem cell (CBSC) collection and preservation have become increasingly significant due to their role in treating various hematological disorders, malignancies, and immunodeficiency conditions. Nurses, being the first-line caregivers during childbirth, play a crucial role in identifying eligible cases, educating parents, and facilitating the collection process.

Aim: This study aimed to evaluate the effectiveness of a structured teaching programme (STP) on knowledge regarding CBSC collection and preservation among staff nurses.

Methods: A pre-experimental one-group pre-test–post-test design was used. **200 staff nurses** working in labor rooms and obstetric wards of a selected tertiary care hospital were recruited using purposive sampling. Data were collected using a validated structured knowledge questionnaire (30 items). The STP consisted of an interactive lecture, visual aids, and printed information about CBSC importance, collection procedures, storage techniques, and ethical/legal aspects. Pre- and post-test knowledge scores were compared using paired t-test.

Results: The mean pre-test knowledge score was **12.8 ± 3.4**, which increased to **23.6 ± 2.8** after the STP (p < 0.001). Majority (65%) had inadequate knowledge pre-intervention, which decreased to 5% post-intervention, while those with adequate knowledge increased to 80%.

Conclusion: The structured teaching programme was highly effective in improving nurses' knowledge regarding cord blood stem cell collection and preservation. Regular in-service education and inclusion of CBSC topics in nursing curricula are recommended to improve practice standards.

Keywords: Cord Blood Stem Cells, Knowledge, Structured Teaching Programme, Nurses, Collection and Preservation, In-Service Education.

Introduction

Cord blood is a rich source of hematopoietic stem cells, which can be used for transplantation in patients with leukemia, lymphoma, aplastic anemia, and several genetic or metabolic disorders. Since the first successful cord blood transplant in 1988, the demand for cord blood banking has increased worldwide. However, lack of awareness among healthcare providers, including nurses, leads to underutilization of this resource.

Nurses play a crucial role in ensuring proper collection, timely transport, and counseling of expectant mothers regarding cord blood donation or banking. If they lack adequate knowledge, opportunities for collection are missed. Therefore, structured training is vital to enhance their knowledge and confidence.

Need for the Study

In India, the utilization rate of cord blood banking remains low despite the rising burden of hematological disorders. Studies indicate that many nurses are unaware of eligibility criteria, timing of collection, storage methods, and consent procedures. Improving their knowledge can increase CBSC collection rates, expand stem cell registries, and ultimately save lives.

Structured teaching programmes have been shown to improve knowledge retention and professional practice. This study aims to scientifically assess the impact of a well-planned teaching intervention on nurses' knowledge, thus contributing to better maternal and neonatal health outcomes.

Objectives

1. **General Objective:**
   To assess the effectiveness of a structured teaching programme on knowledge regarding cord blood stem cell collection and preservation among staff nurses.
2. **Specific Objectives:**
   o   To assess pre-test knowledge regarding CBSC collection and preservation.
   o   To administer a structured teaching programme on CBSC collection and preservation.
   o   To assess post-test knowledge scores.
   o   To compare pre- and post-test knowledge scores.
   o   To find association between pre-test knowledge and demographic variables (age, experience, qualification).

Hypotheses

- **H_1:** There will be a significant increase in mean knowledge scores of staff nurses after administration of STP at $p \leq 0.05$.
- **H_0:** There will be no significant difference in mean knowledge scores of staff nurses after administration of STP at $p \leq 0.05$.

Methodology

Research Design

A **pre-experimental one-group pre-test–post-test design** was selected for this study. This design was chosen because it allows the researcher to measure the knowledge of staff nurses before and after the intervention (Structured Teaching Programme - STP) and evaluate the effectiveness of the intervention by comparing pre- and post-test scores. This design is cost-effective, practical for a hospital setting, and suitable for educational interventions where randomization may not be feasible.

Setting of the Study

The study was conducted in the **labor rooms, obstetric wards, and neonatal intensive care unit (NICU)** of a selected tertiary care hospital. These settings were chosen as they are the primary areas where cord blood stem cell (CBSC) collection is performed, and staff nurses working in these units have direct involvement in maternal and neonatal care.

Population and Sample

The **target population** consisted of all staff nurses working in labor rooms, obstetric wards, and NICU of the selected hospital.

The **accessible population** included those nurses who met the inclusion criteria and were available during the data collection period.

Sample size:

A total of **200 staff nurses** were included, calculated based on expected improvement in knowledge score with a confidence level of 95% and power of 80%.

Sampling technique:

Purposive sampling was employed to recruit nurses who were willing to participate and who were available in the respective clinical areas during the study period.

Inclusion Criteria

- Registered staff nurses working in labor rooms, obstetric wards, or NICU.
- Nurses willing to participate and give informed consent.
- Nurses available during the data collection period.

Exclusion Criteria

- Nurses on long leave or night duty during the study period.
- Nurses who had previously attended a formal training session on CBSC collection and preservation.

Tool for Data Collection

Data were collected using a **structured knowledge questionnaire** consisting of **30 multiple-choice questions** covering:

1. **Basic concepts** of CBSC and its uses.
2. **Eligibility criteria** and timing of collection.
3. **Collection procedures** and handling of collection kits.
4. **Storage techniques and preservation** methods.
5. **Legal, ethical, and consent-related aspects.**

The tool was validated by a panel of **7 subject experts** (obstetrics and gynecology, neonatology, nursing education, and research methodology).

Reliability was established using **Kuder-Richardson Formula-20 (KR-20)** with a coefficient of **0.84**, indicating good internal consistency.

Intervention (Structured Teaching Programme)

The **STP** was a **60-minute interactive session** including:

- **Lecture:** Overview of CBSC importance, collection procedure, and benefits.
- **Demonstration:** Step-by-step procedure of using collection kits and handling specimens.
- **Visual Aids:** Charts, posters, and PowerPoint slides for better comprehension.
- **Discussion:** Opportunity for participants to clarify doubts.
- **Printed Handouts:** Summary of key points provided for future reference.

Data Collection Procedure

1. **Pre-Test:** A structured knowledge questionnaire was administered to assess baseline knowledge of nurses.
2. **Intervention:** Immediately after the pre-test, the STP was conducted for small batches (20–25 nurses per session) to ensure better interaction and participation.
3. **Post-Test:** Conducted **7 days after the intervention** using the same questionnaire to measure knowledge gain and retention.

Ethical approval was obtained from the Institutional Ethics Committee, and informed consent was taken from all participants. Confidentiality and anonymity of participants were maintained throughout.

Plan for Data Analysis

- **Descriptive statistics:** Mean, standard deviation, frequency, and percentage were calculated to describe demographic variables and knowledge scores.
- **Inferential statistics:**
  - **Paired t-test** was applied to compare pre- and post-test mean knowledge scores and assess the effectiveness of the STP.
  - **Chi-square test** was used to find the association between pre-test knowledge scores and selected demographic variables (age, years of experience, qualification). A p-value ≤ 0.05 was considered statistically significant.

Results (Sample Data)

Knowledge Level	Pre-Test (f, %)	Post-Test (f, %)
Inadequate (0–10)	80 (40%)	5 (2.5%)
Moderate (11–20)	90 (45%)	35 (17.5%)
Adequate (21–30)	30 (15%)	160 (80%)

Knowledge Level Distribution (Pre-Test vs Post-Test)
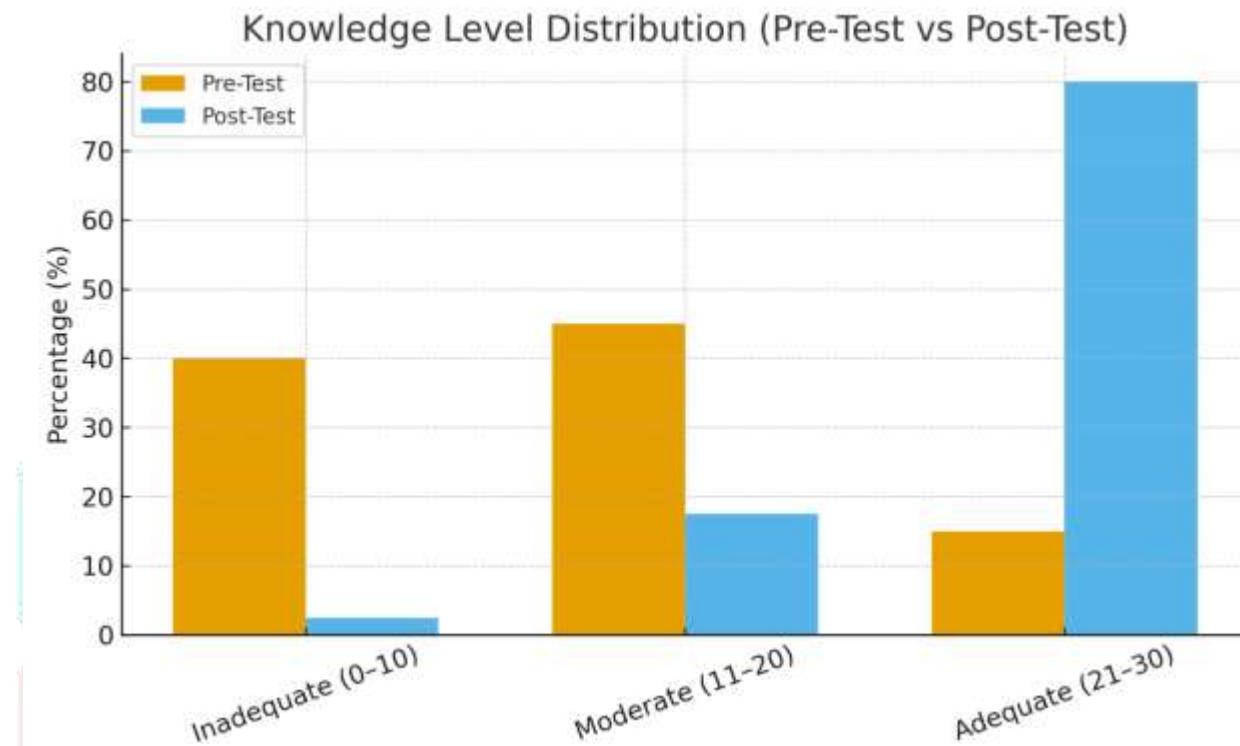
Table: Comparison of Pre-Test and Post-Test Knowledge Scores

Test	Mean	SD
Pre-Test	12.80	3.40
Post-Test	23.60	2.80

Paired t-value: 31.25 (p < 0.001, Highly Significant)

- **Mean pre-test score:** 12.8 ± 3.4
- **Mean post-test score:** 23.6 ± 2.8
- **Paired t-value:** 31.25 ($p < 0.001$, highly significant)

Comparison of Mean Knowledge Scores (Pre-Test vs Post-Test)
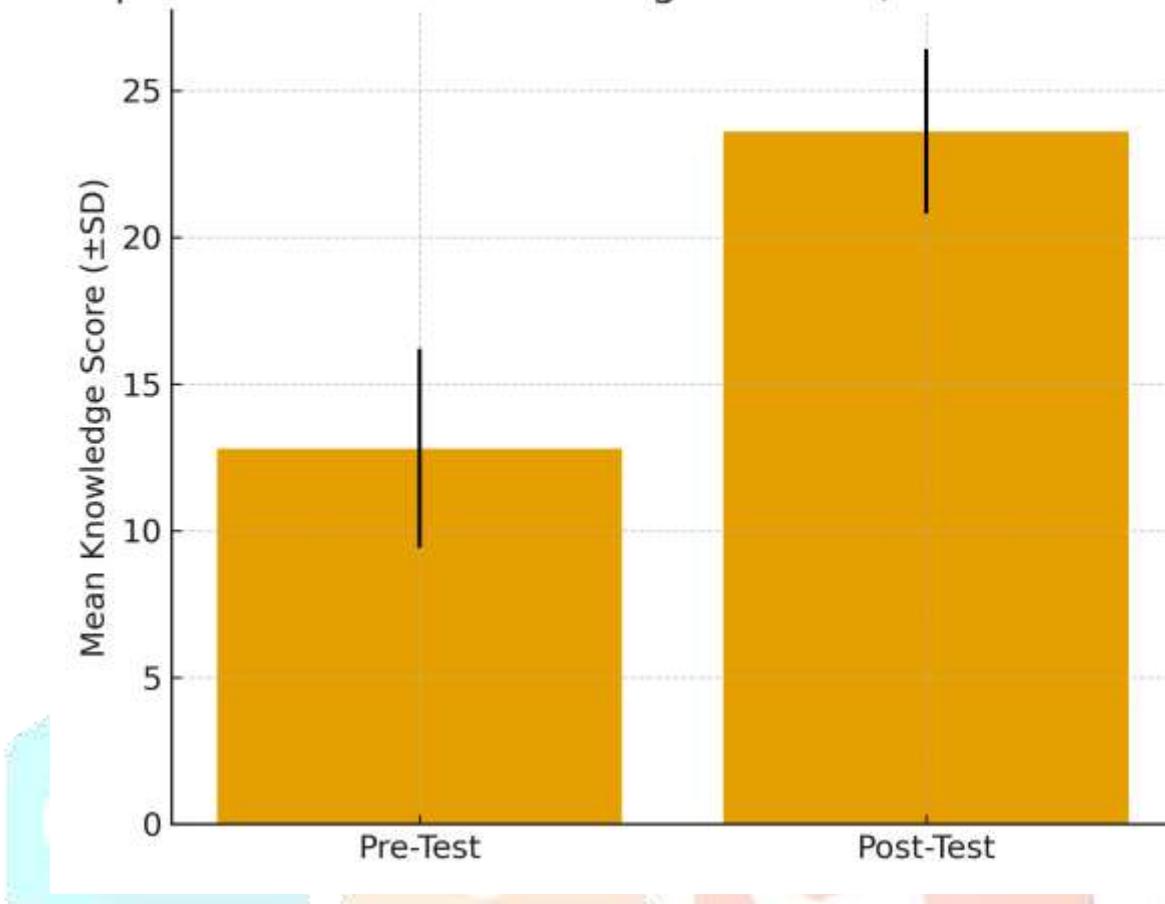
Discussion

The results clearly demonstrate that the STP significantly improved nurses' knowledge regarding CBSC collection and preservation. Similar findings were reported by Nair et al. (2022), who observed a 50% improvement in post-test knowledge among nurses after a structured education session. Increased awareness among nurses is crucial for effective cord blood banking services in India.

Conclusion

Structured teaching programmes are effective in improving nurses' knowledge regarding CBSC collection and preservation. Integrating such programmes into regular in-service education and pre-service curricula will help maximize the potential of cord blood banking and save more lives.

Recommendations

- **Practice:** Include CBSC education in staff nurse orientation and training.
- **Education:** Incorporate CBSC topics into nursing curriculum.
- **Research:** Conduct multi-center studies to compare different educational strategies.
- **Policy:** Encourage hospitals to collaborate with public and private cord blood banks.

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