



# KNOWLEDGE AND ATTITUDE REGARDING MENSTRUAL BLOOD BANKING AMONG NURSING STUDENTS IN TRICHY, INDIA

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## Abstract

Menstrual blood, historically considered waste, has been found to contain mesenchymal stem cells with regenerative potential comparable to umbilical cord and bone marrow sources. Menstrual blood banking offers a promising avenue for cell therapy, yet awareness and acceptance remain low, particularly in cultures with menstrual taboos. Nursing students, as future health educators, play a crucial role in disseminating accurate knowledge. The Objective of this study are to determine the level of knowledge of nursing students on menstrual banking, to find out the attitude regarding menstrual banking among nursing students and to find the association between level of knowledge on menstrual blood banking among nursing students. A descriptive, cross-sectional study involving 123 third-year B.Sc. and DGNM nursing students, out of which 23 DGNM students were taken for pilot study, was conducted using a self-structured questionnaire. Knowledge (30 MCQs) and attitude (30 Likert-scale items) were analysed. Demographic variables were also collected. Data were analysed using descriptive and inferential statistics. The result shows that Most students demonstrated average knowledge (64%), while 22% had below-average and only 14% above-average scores. Attitudinal responses were overwhelmingly positive, with 99% demonstrating a desirable attitude toward menstrual blood banking. No significant association was found between knowledge levels and demographic variables ( $p > 0.05$ ). The study concluded that Although attitudes toward menstrual blood banking were positive, knowledge levels remain inadequate among nursing students. Curriculum integration and targeted educational initiatives are needed to prepare future healthcare providers for this evolving area of regenerative medicine.

**Keywords:** Menstrual blood banking, nursing students, stem cells, knowledge, attitude, regenerative medicine

## 1. Introduction

### 1.1. Background

Menstruation is a natural biological process that signifies a woman's reproductive health. Typically occurring on a 28–30-day cycle, it involves the shedding of the uterine lining and results in the discharge of blood and endometrial tissue through the vagina. Despite its physiological importance, menstruation is often shrouded in stigma and considered impure, especially in developing countries like India.

Recent scientific discoveries have redefined this process by identifying stem cells within menstrual blood. These stem cells exhibit properties similar to mesenchymal stem cells found in bone marrow and umbilical cord blood. With the ability to differentiate into various cell types such as cardiac, neural, hepatic, and adipose tissue cells, menstrual stem cells represent a breakthrough in regenerative medicine. Their potential application ranges from treating cardiovascular diseases to neurodegenerative disorders and diabetes mellitus [1].

### 1.2. What is Menstrual blood banking?

Menstrual blood banking is the collection, processing, and cryopreservation of menstrual blood for future use. Companies like Cryo-Cell International (USA) and LifeCell (India) have pioneered commercial banking of menstrual stem cells. Collection is typically done using a medical-grade silicone cup during the heaviest day of menstrual flow. After collection, the sample is sent to specialized laboratories for processing and storage under controlled conditions.

Unlike embryonic stem cells, menstrual stem cells present fewer ethical concerns and are readily accessible, non-invasive to collect, and abundant. Moreover, menstrual blood can be collected monthly, making it a renewable resource for potential autologous or allogenic therapy [2].

### 1.3. The Gap in Awareness

Despite the benefits, societal taboos, lack of education, and poor dissemination of scientific knowledge have led to widespread misconceptions about menstrual blood and its potential. In many regions of India, menstruation is viewed through a cultural lens of impurity. According to studies, 60% of women in cities like Chennai believe menstrual blood to be impure, while only a third in cosmopolitan cities such as Delhi and Mumbai are free from such taboos [3].

Healthcare professionals play a critical role in demystifying such beliefs. Unfortunately, research shows that even among nurses and nursing students — who are expected to be health knowledge bearers — awareness about menstrual blood banking is low. A study in Egypt revealed that nearly 80% of maternity nurses had inadequate knowledge of menstrual blood banking [4].

### 1.4. Importance of the Study

A quasi-experimental study was conducted to assess knowledge and attitude of maternity nurses regarding menstrual blood collection and stem cells. The study was conducted at two settings in two different hospitals. Data was collected by using structured interviewing questionnaire. and nurse's attitude towards menstrual blood collection and results shows that 88.7% of nurses had poor knowledge before intervention. However 90.6% and 81.25% of them had good knowledge immediately and after three months of intervention respectively as well as 1.9% of the nurses had positive attitude toward menstrual blood collection and stem cells before intervention and it was changed to 66.0% and 69.8% respectively after intervention. Dr Hans N, Kaur S (2016) conducted a study to assess effectiveness of structured teaching program on knowledge regarding menstrual blood stem cells

banking among graduate nursing students in selected colleges in Punjab. The study was an evaluative study carried out on 96 nursing students. Purposive sampling technique was used to select the sample. Results of the study revealed that according to pre-test knowledge, majority (92.7%) of nursing students had average knowledge regarding menstrual blood stem cells banking and according to post-test knowledge, majority (88.5%) of nursing students had good knowledge. On comparing, mean post-test knowledge score was more than pretest knowledge score which was calculated by t-test ( $t=19.197$ ) at  $p<0.05$  level of significance. The study concluded that structured teaching program was effective to enhance the knowledge of nursing students regarding menstrual blood stem cells banking.

Nurses are at the frontline of patient education and play a vital role in disseminating accurate and up-to-date information. Their understanding and perception of menstrual blood banking could significantly influence public acceptance. Nursing students, as future professionals, must be equipped with knowledge that reflects the latest medical advancements. This study seeks to evaluate the knowledge and attitude of nursing students towards menstrual blood banking and thereby identify areas for educational intervention.

### 1.5. Objectives

- To determine the level of knowledge of nursing students regarding menstrual blood banking.
- To assess the attitude of nursing students toward menstrual blood banking.
- To examine associations between demographic variables and knowledge levels.

## 2. Methodology

### 2.1. Study Design

This study employed a descriptive, cross-sectional design with a quantitative approach. It was conducted over one week in February 2024 at KMC College of Nursing, Trichy.

### 2.2. Participants and Sampling

A total of 123 nursing students, including 90 third-year B.Sc. Nursing and 33 DGNM students, were selected through convenience sampling, out of which 23 DGNM students were taken for pilot study. Students eligible for inclusion were those present during data collection and willing to participate voluntarily.

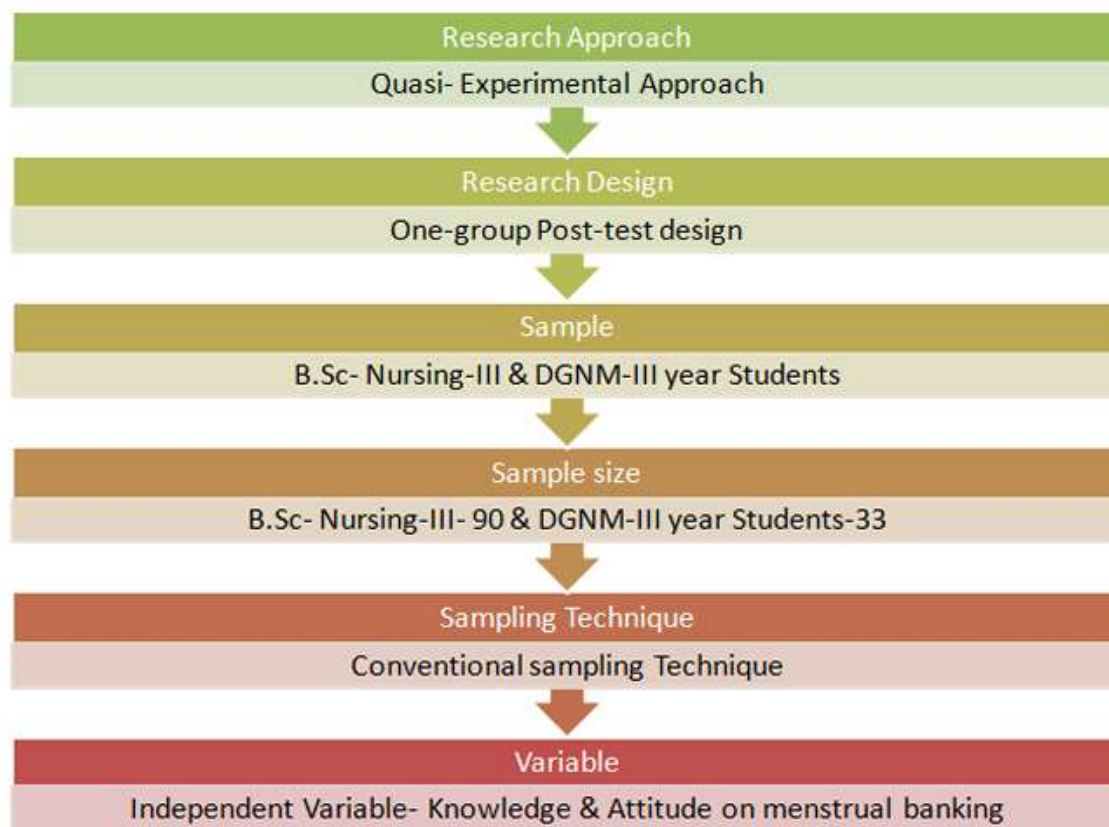


Fig 3.1 shows the research methodology

### 2.3. Instrumentation

A self-structured questionnaire was used, comprising three sections:

- **Section A:** Demographic data (age, family type, area of residence, educational qualification, menstrual cycle regularity, and presence of menstrual pain).
- **Section B:** 30 multiple-choice questions to assess knowledge of menstrual blood banking.
- **Section C:** 30 attitude items on a 5-point Likert scale (strongly agree to strongly disagree).

#### Scoring:

- Knowledge scores were categorized as:
  - Below average: <50%
  - Average: 51–75%
  - Above average: >75%
- Attitudes were labelled as desirable (positive responses to 75% or more items) or undesirable.

### 2.4. Validity and Reliability

Content validity was ensured through expert reviews from nursing education faculty. The reliability of the knowledge tool was established using the split-half method with a correlation coefficient of  $r = 0.86$ .

## 2.5. Ethical Considerations

Ethical clearance was obtained from the (college) institutional ethics committee. Informed oral consent was secured from all participants. Data confidentiality and anonymity were assured throughout.

## 2.6. Data Collection Procedure

Data were collected using the structured questionnaire in a classroom setting. The average duration per participant was 25–30 minutes. Data collection was conducted under supervision to ensure uniformity.

## 2.7. Data Analysis

Data were analysed using SPSS software. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used for baseline data. Chi-square tests assessed associations between demographic variables and knowledge levels, with significance set at  $p < 0.05$ .

## 3. Results and Discussion

### 3.1. Demographic Characteristics

**Table 1: Demographic Distribution of Participants (N = 100)**

| Variable                  | Category        | Frequency | Percentage (%) |
|---------------------------|-----------------|-----------|----------------|
| Age                       | 20              | 59        | 59             |
|                           | 21              | 39        | 39             |
|                           | 22              | 2         | 2              |
| Family Type               | Nuclear         | 53        | 53             |
|                           | Joint           | 37        | 37             |
| Area of Residence         | Rural           | 50        | 50             |
|                           | Urban           | 40        | 40             |
|                           | Semi-Urban      | 10        | 10             |
| Educational Qualification | B.Sc (III year) | 83        | 83             |
|                           | DGNM (III year) | 17        | 17             |
| Regular Menstrual Cycle   | Yes             | 78        | 78             |
|                           | No              | 22        | 22             |
| Painful Menstrual Cycle   | Yes             | 33        | 33             |
|                           | No              | 67        | 67             |

The majority of students were aged 20 (59%) and enrolled in B.Sc. Nursing (83%). Half resided in rural areas, highlighting the importance of reaching underserved populations.

### 3.2. Knowledge Levels on Menstrual blood banking

**Table 2: Distribution of Knowledge Levels Among Nursing Students**

| Knowledge Level      | Frequency (n = 100) | Percentage (%) |
|----------------------|---------------------|----------------|
| Below Average (<50%) | 22                  | 22             |
| Average (51–75%)     | 64                  | 64             |
| Above Average (>75%) | 14                  | 14             |

Most students (64%) scored in the average category, indicating a moderate understanding of menstrual blood banking. A significant portion (22%) demonstrated poor knowledge, while only a small percentage (14%) achieved high scores.

These results align with prior studies such as Hans and Kaur (2016), who noted that only 7.3% of nursing students had good knowledge in the pre-test phase before a structured teaching intervention was introduced [5].

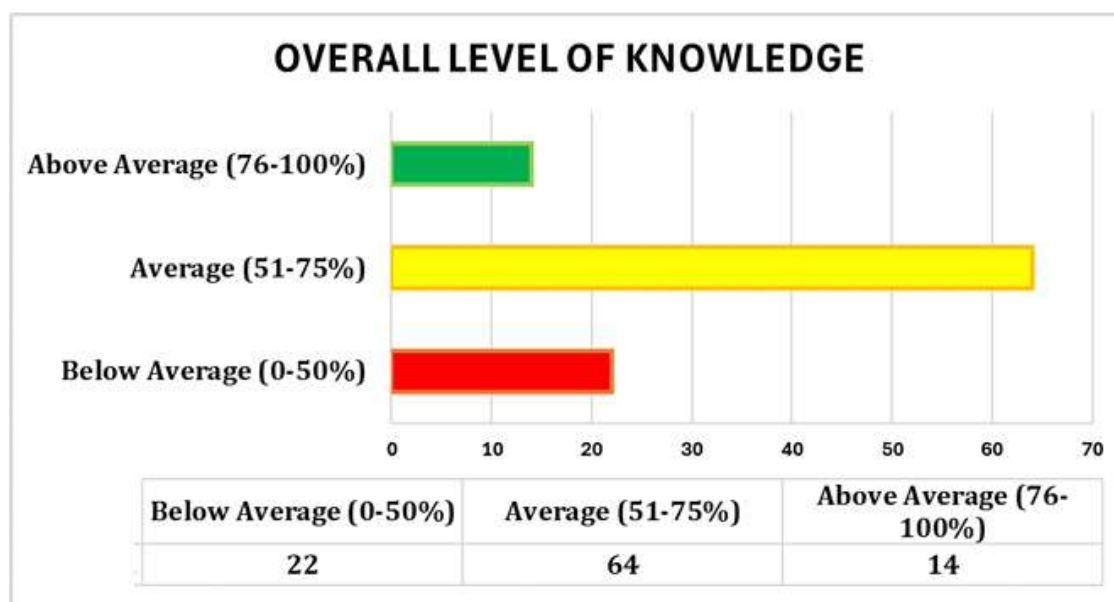


Fig 4.1 bar diagram shows on the frequency and percentage distribution of the nursing students based on their overall level of knowledge

### 3.3. Attitudes Towards Menstrual blood banking

**Table 3: Attitudinal Distribution of Participants**

| Attitude Level | Frequency | Percentage (%) |
|----------------|-----------|----------------|
| Desirable      | 99        | 99             |
| Undesirable    | 1         | 1              |

The findings revealed an overwhelmingly positive attitude among participants. Nearly all students (99%) showed a desirable attitude, suggesting openness to the concept of menstrual blood banking, despite varying knowledge levels.

This optimism reflects similar trends in the literature. For example, Dhaka (2021) found that student attitudes improved significantly post-education, even if prior knowledge was lacking [6].

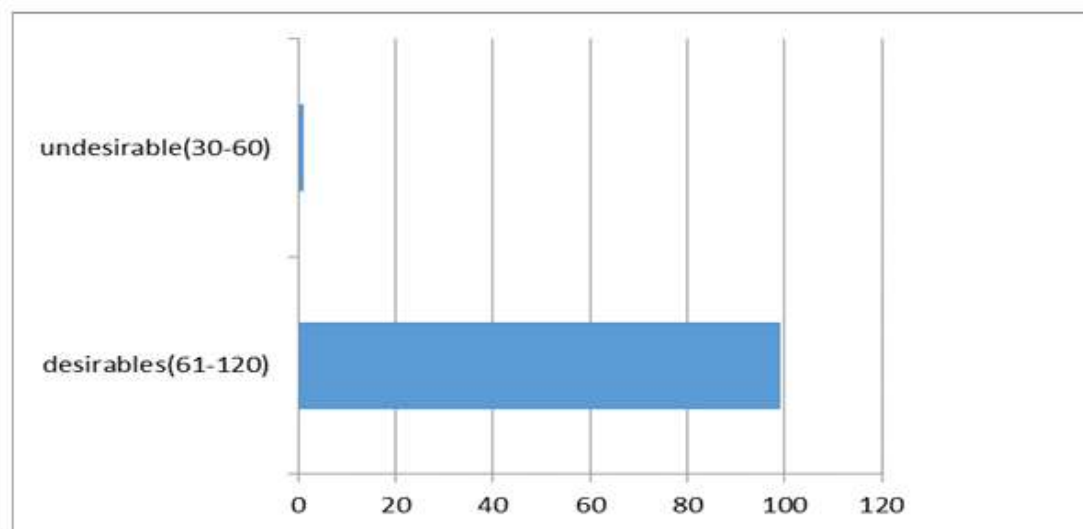


Fig.4.2 bar diagram shows the percentage distribution of the nursing students based on their overall level of attitude

### 3.4. Association Between Demographic Variables and Knowledge

Table 4: Chi-Square Test of Association Between Demographic Variables and Knowledge Levels

| Demographic Variable      | Chi-Square Value | p-value | Significance |
|---------------------------|------------------|---------|--------------|
| Age                       | 2.905            | 0.574   | NS           |
| Family Type               | 1.915            | 0.384   | NS           |
| Area of Residence         | 2.934            | 0.569   | NS           |
| Educational Qualification | 2.707            | 0.009   | NS           |
| Regular Menstrual Cycle   | 1.828            | 0.401   | NS           |
| Painful Menstrual Cycle   | 0.193            | 0.908   | NS           |

(NS = Not Significant at  $p > 0.05$ )

There was no statistically significant association between knowledge levels and any demographic variables. This suggests that awareness is uniformly distributed across age, education level, and menstrual history. This finding is consistent with studies by Podder (2019) and Gupta & Kaur (2020), which noted that awareness was limited regardless of background unless targeted education was provided [7,8].

### 3.5. Discussion

Despite the generally positive attitude observed among nursing students, the data indicate a considerable gap in knowledge. This discord between attitude and understanding points to a broader phenomenon—students may be conceptually supportive of novel health practices without necessarily being well-informed about them.

The overwhelmingly positive attitude could be due to:

- Curiosity and openness among younger individuals.
- Societal shift toward more progressive discussions about menstruation.
- Influence from digital media and informal peer networks.

However, the lack of detailed knowledge suggests that formal nursing curricula may not adequately cover advancements like menstrual stem cell banking.

#### Comparison with Previous Studies:

- **Akhila et al. (2022):** Found poor awareness but openness to adoption among Indian nursing students [9].
- **Sharma (2021):** Identified that only 22% of urban Indian women had a positive attitude toward menstrual blood banking, with even fewer being knowledgeable [10].
- **C.U. Jomon et al. (2019):** Found 34.1% of healthcare professionals had poor knowledge, while 65.5% held unfavourable attitudes, suggesting that targeted teaching can shift perspectives significantly [11].

#### Barriers Identified in Literature:

- Lack of structured education.
- Cultural taboos around menstruation.
- Absence of institutional policy or clinical exposure.
- Limited availability of menstrual blood banking facilities in India.

#### Opportunities:

Given their unique role, nursing students are ideal ambassadors for spreading awareness about menstrual blood banking, especially if knowledge gaps are addressed through structured modules, clinical training, and simulation.

## 4. Conclusion

This study sought to evaluate nursing students' knowledge and attitudes regarding menstrual blood banking in a conservative yet educationally progressive region of India—Trichy. The findings paint a nuanced picture.

### 4.1. Key Findings

- **Knowledge Gap:** While 64% demonstrated average understanding, only 14% were well-informed.
- **Positive Attitude:** An impressive 99% displayed openness to the concept.
- **No Demographic Correlation:** Knowledge levels were independent of variables like age, education, and menstrual history.

### 4.2. Implications

The results underscore the pressing need to include menstrual blood banking in the formal nursing curriculum. Educators should treat menstrual blood banking not as an optional innovation but as a core topic in reproductive health, regenerative medicine, and biotechnology.

Workshops, simulations, and seminars should be routinely organized to improve clinical and theoretical understanding. Nursing leadership should also advocate for including menstrual banking awareness in public health programs, especially in rural areas where taboos are deeply entrenched.

#### 4.3. Strengths and Limitations

##### Strengths:

- Inclusion of both B.Sc. and DGNM students ensures diverse perspectives.
- Tool validity and reliability were rigorously assessed.

##### Limitations:

- Convenience sampling may introduce selection bias.
- Limited to a single institution, affecting generalizability.
- Self-reported data may be subject to social desirability bias.

#### 4.4. Recommendations

##### For Nursing Education:

- Update the syllabus to include emerging topics like menstrual stem cells.
- Introduce simulation-based learning for practical exposure.

##### For Clinical Practice:

- Educate patients about stem cell therapies and available options.
- Collaborate with biotech companies for exposure to real-world applications.

##### For Research:

- Conduct longitudinal studies to track the impact of interventions.
- Expand the scope to other healthcare institutions for comparative data.

##### Policy Advocacy:

- Push for national awareness campaigns.
- Encourage public-private partnerships for menstrual blood banking infrastructure.

#### 4.5. Conclusion

Menstrual blood banking represents a significant leap in regenerative medicine. As future frontline health educators, nursing students must be equipped with both the knowledge and confidence to advocate for this

innovation. This study shows that while attitudes are fertile ground for change, substantial educational input is required to translate optimism into action.

The way forward lies in embedding menstrual blood banking into the educational and ethical discourse of modern nursing.

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## Conflict of Interest

The authors declare no conflict of interest.