

Effectiveness of Video-Assisted Teaching Module (VATM) on Knowledge regarding Umbilical Cord Blood Stem Cells Banking among Staff Nurses in Selected Hospitals of Odisha

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Abstract

An evaluative and quantitative research with pre-experimental one group pre- and post-test design was used to assess the effectiveness of video-assisted teaching module (VATM) on knowledge regarding umbilical cord blood (UCB) stem cell banking among 190 staff nurses working in SCB MCH, Cuttack, Odisha, selected through the non-probability convenience sampling technique. The overall pre-test mean score was 16.34 ± 3.46 , which is 47 percent of the maximum score, whereas it was 25.78 ± 3.05 , which is 74 percent in the post-test. A majority (61.6%) had average knowledge during the pre-test, whereas post-test knowledge after imparting VATM, most (75.8%) of the staff nurses had good knowledge and 19.5 percent had excellent knowledge. A paired 't' test was calculated, and the obtained 't' value was 49.61 with $p < 0.001$, which was statistically highly significant between pre- and post-test knowledge scores in all the areas. There was no significant association between the post-test scores and selected demographic variables. The study recommends a need for formal training of staff nurses regarding UCB stem cell banking.

Key words: Video-assisted teaching module, UCB stem cell banking, Staff nurse

Umbilical cord blood (UCB) was thought of as a waste product of the birthing process before 1970, but now it is valued for the presence of haemopoietic stem cells as an alternative source of bone marrow. In India, there are approximately 72,000 births daily, so also discarding of 72,000 umbilical cords a day. Hence, the so-called waste can be of significant value for human survival and is an abundantly available source of stem cells (Bobak & Jenson, 1995; Waller-Wise, 2011; Steven, 2011; Roura et al, 2015; Peberdy et al, 2018).

Stem cells are the basis of the human body and are viewed as the master cells of the body. Blood, bones, skin and muscle tissue are fashioned from the master cells recognised as stem cells that act as constructing blocks of our body. Just like a seed of a plant which offers branches, leaves and fruits, these stem cells can grow into specialised cells of our body, such as blood cells, muscle cells, brain cells and so forth (Vignesh et al, 2017).

Among the various sources of stem cells, UCB has proved to be a unique source, providing several advantages over other sources. Most importantly, UCB-derived stem cells are readily available and

can be obtained non-invasively during the process of delivery. Moreover, their banking potential adds a lot to their importance for regenerative medicine (Mayani H, 2020).

UCB-MSCs therapy may show some positive effect in treating critical COVID-19 to some extent, for its delaying deterioration of the disease and efficacy in respiratory and renal function, though limited (Tao J, et al, 2020).

Objectives

The study was set with following objectives:

1. To assess the existing knowledge of staff nurses regarding UCB stem cell banking.
2. To evaluate the effectiveness of VATM regarding UCB stem cell banking among staff nurses.
3. To find out the association between the post-test knowledge scores of staff nurses and their selected demographic variables.

Need for the study: UCB contains a large quantity of haematopoietic stem cells (HSCs) that have been used successfully for allogenic transplantation to treat a variety of genetic, haematologic and oncologic disorders. It proves to be a potential alternative when autonomous or allogenic transplantation with HLA-matched marrow is unavailable for children (Paytal et al, 2018).

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Therefore, the researchers, being a nurse, were fascinated to carry out the research project regarding UCB stem cells banking among staff nurses as it is felt that exploring existing knowledge and providing education through video to enhance knowledge will be beneficial to the staff nurses in their clinical setting.

Hypotheses:

H₀₁: There is no significant difference between pre-test and post-test knowledge scores of staff nurses regarding UCB stem cell banking.

H₀₂: There is no significant association between post-test knowledge scores of staff nurses regarding UCB stem cell banking with their selected demographic variables.

The conceptual framework of study based on theory of Ludwig von Bertalanffy is shown in Fig 1.

Review of Literature

The literature reviewed for the present study contains general information on stem cells and UCB stem cells banking, existing knowledge of staff nurses on UCB stem cells banking, effect of educational programme on staff nurses' knowledge regarding UCB stem cell banking and effectiveness of video-assisted teaching module (VATM) on knowledge of staff nurses regarding UCB stem cells banking.

Stem cells are unique cells that can be regenerated and transformed into different types of mature and functional cells while maintaining their original identity. This unique ability of stem cells discovered its significance in regenerative medicine and has laid the foundation for cell-based therapies (Mahla, 2016 and National Institutes of Health, 2019).

Umbilical cord blood is a primitive and abundant source of mesenchymal stem cells. UCB-derived MSCs have a broad and efficient therapeutic capacity to treat various diseases and disorders. Despite the high latent self-renewal and differentiation capacity of these cells, the safety, efficacy, and yield of MSCs expanded for ex vivo clinical applications remains a concern (Um S, et al; 2020).

Over 40,000 UCB transplantations have been performed worldwide for the treatment of around 80 medical disorders. Approximately 800,000 UCB units are stored in public banks worldwide, while more than 4 million units are stored in private banks (Mayani H, 2020).

Maternity nurses are an integral part of health care providers in all phases of life. Nurses' knowledge and attitude regarding umbilical cord blood collection will help to achieve this process successfully. Nurses have a specified role in teaching patients. They have a reliable source of health information, so they must be aware of the latest medical diagnoses and treatment (David M et al, 2020).

Mothers who got information from professional sources did not need additional information. Conversely, mothers who turned to other mothers for information were more likely to desire further information. Most mothers report the Internet as the main source of information. Providing accurate information through official sources may result in a more positive attitude toward donation (Grano C, 2020).

Nurses and midwives are part of health care in all the stages of our lives. Thus, nurses must be knowledgeable and aware of recent trends in diagnosis and treatment. Continuing education provides a means by which nurses can remain up to date with current developments, maintain their competence and meet the standards of nursing practice (Malathi P, 2021).

Materials and Methods

The research approach adopted was quantitative type. It had a pre-experimental one group pre-test & post-test design. The study was set in SCB, Medical College & Hospital (MCH), Cuttack (Odisha). Staff nurses working in SCB AMCH Medical College & Hospital, Cuttack constituted the study population.

Sample & sample size: Two hundred staff nurses working in SCB MCH,

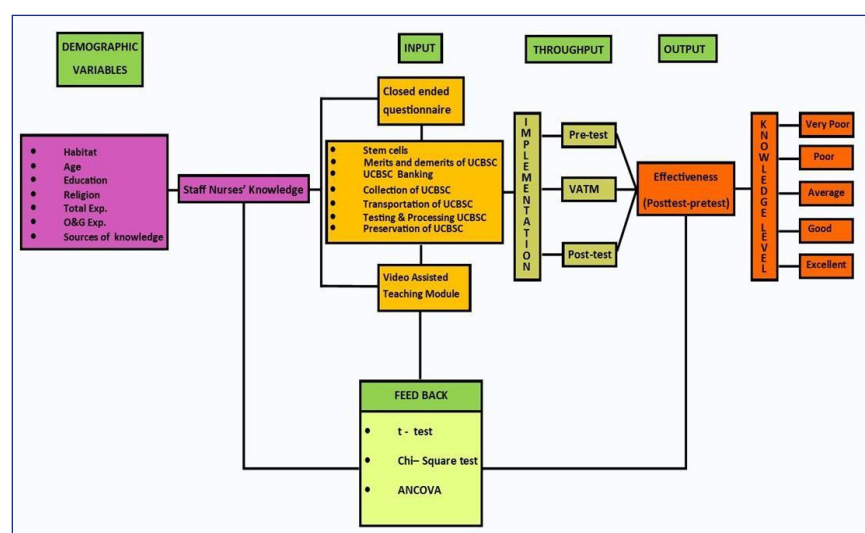


Fig 1: Modified framework based on General systems theory of Ludwig-Von Bertalanffy.

Cuttack, were selected as samples for the study. However, five staff nurses did not attend pre-test, and another five staff nurses did not attend the post-test.

Sampling technique: Convenience sampling technique was used.

Ethical consideration: Written permission was taken from the authorities, and written consent was taken from the staff nurses. Confidentiality and autonomy were assured.

Research Tools for Data Collection

Closed-ended questionnaire has two parts. Part A included demographic data like habitat, age, religion, educational qualification, total experience and experience in the OG department, and sources of knowledge. Part B included multiple-choice questions on UCB.

Validity: The tools after construction were sent to 10 experts from related fields of research for validation.

Reliability: The reliability of the tool was established by testing the internal consistency. The reliability of the questionnaire was tested through the half method. The correlation coefficient was calculated using the Spearman Brown Prophecy formula. The reliability obtained was 0.894, which indicated that the questionnaire is highly reliable to conduct a research study.

Pilot study: After testing the reliability and validity of the research tool, a pilot study was conducted in the 130-bed District Headquarter Hospital, Cuttack, among 30 samples and analysed for feasibility of the main study.

Data Collection Procedure

Step I: The pre-test was conducted at SCB MCH, Cuttack, Odisha, on 1 August 2020. Due to Covid-19 pandemic, before collecting data, rooms were selected to make participants comfortable before administering the questionnaire and to avoid contamination of the samples and preventing disturbances in the work schedule of staff nurses; three groups were made with 25-30 staff nurses in one hall and pre-test was conducted in three shifts in a single day. Later, all the questionnaires were collected by the researcher herself. A total of 195 participants attended and submitted filled questionnaires.

Step II: The investigator sent VATM to all participants through their e-mail id; 15 days were given to go through the video, and to contact the investigator and clear the doubts if any queries arise. The majority of participants had doubts about the timing of UCB collection, testing and processing of UCB stem cells and preservation of

UCB stem cells. All the doubts of the participants were cleared.

Step III: In the next phase, the post-test was conducted after a week's interval on 16 August 2020 using the same questionnaire which was used for the pre-test. Nurses available in each shift were interviewed consecutively within three hours. Later, all the questionnaires were collected. In the post-test, 195 staff nurses had attended and submitted filled questionnaires.

After the post-test, the filled-in questionnaires of both the pre-test and post-test were compared. It was found that out of 200 staff nurses, five did not attend the pre-test, and five staff nurses did not attend the post-test. So, they were excluded from the study. Hence, the actual sample size for the present study was 190.

Results

Demographic Characteristics

The frequency- and percentage-wise distribution of staff nurses is shown in Table 1.

Table 1: Frequency and percentage-wise distribution of staff nurses according to their selected demographic variables (N=190)

Demographic data		Frequency (n)	Percentage (%)
Variables	Groups		
Habitat	Urban	179	94.21
Age	31-40 years	70	36.84
Religion	Hindu	190	100
Educational qualification	Diploma in Nursing	139	73.16
Total years of experience as staff nurse	1-5 years	61	32.11
Years of experience in the Obs. and Gynaec department	1-5 years	106	55.79
Sources of knowledge	From professionals	86	45.26

Pre-Test Knowledge of Staff Nurses regarding UCBSC Banking

Table 2: Area-wise and overall mean, SD, and mean of pre-test knowledge scores among staff nurses regarding UCB stem cells banking (N=190)

Area	Pre-test score				
	Max	Range	Mean	SD	Mean (%)
Preservation of UCBSC	3	0-3	1.76	1.03	59
Testing & processing of UCBSC	3	0-3	1.19	0.77	40
Overall	35	9-24	16.34	3.46	47

Table 2 reveals that the highest mean score (1.76 ± 1.03) was in the area of 'preservation of UCBSC', which is 59 percent of the maximum score. The lowest mean score (1.19 ± 0.77), which is 40 percent of the maximum score was found in the area of 'Testing and processing of UCBSC' and the overall pre-test mean score was 16.34 ± 3.46 , which is 47 percent of the maximum score, which depicts average level of knowledge score of staff nurses in pre-test.

Comparison of Pre- and Post-Test Knowledge of Staff Nurses regarding UCBSC Banking

It is observed that the increase in the knowledge score varies from around 26 percent to 30 percent for all the areas, except in 'preservation of UCBSC' which is only 7 percent, where the pre-test mean was highest (59%), depicting less effectiveness (Table 3 and Fig 2).

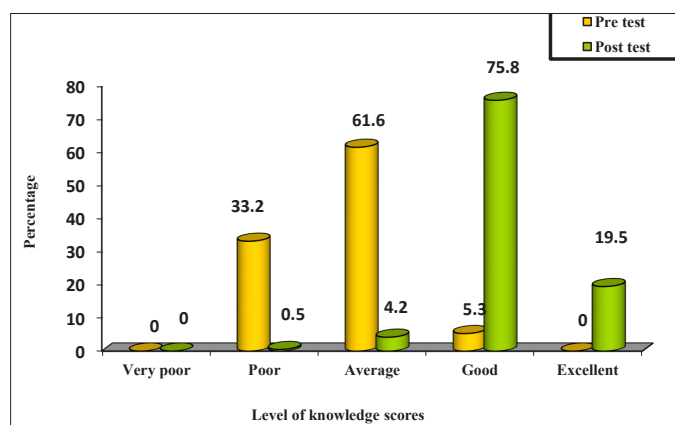


Fig. 2 : Cylinder diagram showing percentage of the pre-and post-test level of knowledge scores

Fig 2 shows the difference in pre-and post-test level of knowledge of staff nurses regarding UCBSC banking depicting that during pre-test 61.6 percent had average knowledge and 33.2 percent had poor

knowledge. Only 5.3 percent had good knowledge whereas during post-test most (75.8 percent) of the staff nurses had good knowledge and 19.5 percent had excellent knowledge. Only 4.2 percent had average knowledge. It can be interpreted that the improvement in the post-test knowledge on UCBSC, might be due to the effect of VATM. It seems that the VATM was effective in enhancing the knowledge of staff nurses regarding UCBSC banking.

Fig. 3 reveals that pre-test line was above the post-test line in the graph. The difference between pre and post-test curve was highest at Q1, Q2 and Q3 level showing a difference of 8-10 scores which is around 23 percent to 25 percent. Hence, it can be interpreted that the intervention with VATM on UCBSC banking was effective.

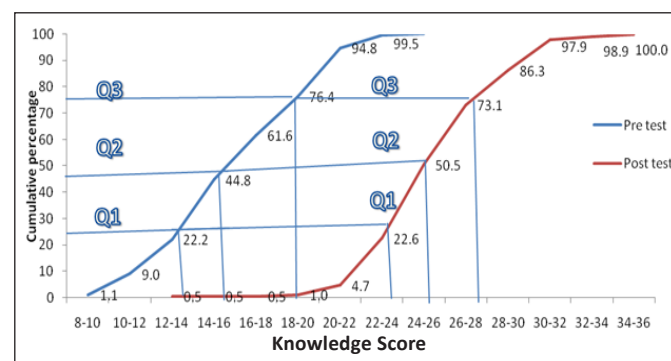


Fig 3: O-give curve showing the quartile percentage between pre and post-test knowledge scores.

The line graph shows that the pre-test line is above the post-test line up to 20-22 score whereas the post-test line is above the pre-test line from 22-24 class intervals (Fig 4). The mean score of pre-test was between 14-16 class interval which reveals the post-test mean was 10 score higher when compared to pre-test. Hence, it can be interpreted that the intervention with VATM on UCBSC banking was effective.

Table 3: Paired 't' test to assess the effect of VATM on UCBSC banking among staff nurses (N=190)

Knowledge	Pre-test		Post-test		Mean difference	't'- value	Table value	p-value
	Mean	SD	Mean	SD			(HS/NS)	
Stem cells	3.88	1.56	5.47	1.05	1.58	18.13	1.962 (HS)	p<0.001***
Merits and demerits of UCBSC	2.14	1.17	3.67	0.88	1.53	20.87	1.962 (HS)	p<0.001***
UCBSC banking	1.23	0.93	2.10	0.72	0.86	14.67	1.962 (HS)	p<0.001***
Collection	4.83	1.50	8.07	1.28	3.24	28.77	1.962 (HS)	p<0.001***
Transportation	1.27	0.94	2.15	0.81	0.88	13.54	1.962 (HS)	p<0.001***
Testing and processing	1.19	0.77	1.98	0.69	0.78	15.14	1.962 (HS)	p<0.001***
Preservation	1.76	1.03	1.98	0.69	0.53	10.89	1.962 (HS)	P<0.001***
Overall	16.34	3.46	25.78	3.05	9.44	49.61	1.962 (HS)	p<0.001***

df=189, HS-Highly significant, NS-Not significant

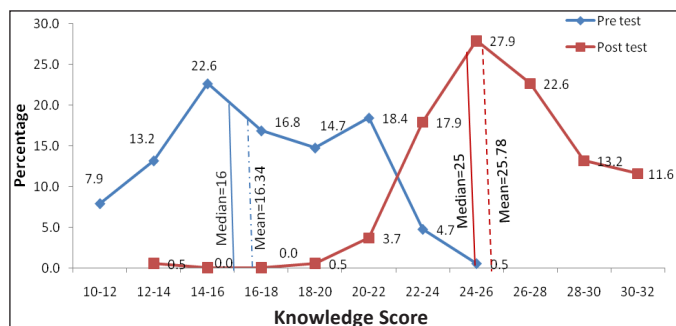


Fig 4: Line graph showing comparison of pre and post-test knowledge scores.

Assessment of Level of Significance of Intervention of VATM on Knowledge

Paired 't' test was calculated to find out significant difference within group test scores among staff nurses revealed that there was a highly statistically significant difference between pre-and post-test knowledge scores in all the areas, whereas, there was a highly significant difference outcome scores between pre-test (4.83 ± 1.50) and post-test (8.70 ± 1.28) with mean difference 3.24 and obtained 't' value 28.77 with $p < 0.001$ found in the areas of 'collection' (Table 3). However, there was a highly statistically significant difference outcome scores

between pre-test (1.76 ± 1.03) and post-test (1.98 ± 0.69) with lowest mean difference 0.53 and the obtained 't' value 10.89 with $p < 0.001$ found in the areas of 'Preservation'.

It can be interpreted that overall, all the areas had highly statistically significant differences found between pre-test and post-test. Hence, the null hypothesis is rejected, and the alternative hypothesis is accepted indicating that VATM was highly effective in improving the knowledge of staff nurses on UCBSC banking.

Assessment of Association between Post-Test Knowledge Scores and Selected Demographic Variables

Association between post-test knowledge score and selected demographic variables shows that the level of knowledge had no significant association for all demographic variables Table 4. Hence, it can be interpreted that VATM was highly effective irrespective of the differences in the demographic characteristics.

The two-way analysis of co-variance (ANCOVA) for the interaction effect between post-test knowledge (dependent variable) and demographic

Table 4: Association between level of knowledge in post-test and selected demographic data (N=190)

Demographic variables	χ^2	df	Table value	p-value	Significance
Habitat	1.314	3	7.82	0.726	Not Significant
Age (in years)	10.24	9	16.92	0.331	Not significant
Religion	0	1	3.84	1	Not Significant
Educational qualification	15.59	9	16.92	0.077	Not Significant
Total year of experience as staff nurse	8.599	9	16.92	0.475	Not Significant
Year of experience in Obs. and Gynaec department	7.717	9	16.92	0.563	Not Significant
Sources of knowledge on UCB stem cells banking	6.011	9	16.92	0.739	Not significant

Table 5: Two-way univariate ANCOVA–Knowledge between subjects' effects

Demographic data	Covariate variables (pre-test) (p-value)	Demographic variables F-value (p-Value)	Interaction effect F-value (P-Value)	Levene's test (Post-test)
Habitat	15.426 ($p < 0.001^{***}$)	0.311 ($p = 0.578$)	0.200 ($p = 0.655$)	$f = 4.330$ $p = 0.039$
Age (in years)	123.48 ($p < 0.001^{***}$)	3.73 ($p = 0.012^{**}$)	3.599 (0.015*)	$f = 1.44$ $p = 0.228$
Educational- qualification	74.8 ($p < 0.001^{***}$)	0.206 ($p = 0.814$)	0.18 (0.982)	$f = 0.502$ $p = 0.681$
Total years of experience as staff nurse	139.16 ($p < 0.001^{***}$)	0.619 ($p = 0.604$)	0.779 ($P = 0.507$)	$f = 1.828$ $p = 0.144$
Years of experience in O & G department	73.22 ($p < 0.001^{**}$)	0.373 ($p = 0.773$)	0.418 ($p = 0.740$)	$f = 1.263$ $p = 0.289$
Sources of knowledge	60.627 ($p < 0.001^{**}$)	0.726 ($p = 0.538$)	0.829 (0.480)	$f = 0.251$ $p = 0.861$

variables (independent variables) when adjusted the pre intervention knowledge (covariate) (F-value) reveal that there was no statistically significant difference between adjusted means at 0.05 level of significant ($p>0.001$)(Table-5).

Discussion

In the present study, the majority (36.84%) of staff nurses were in the age group of 31-40 years.

It is similar to the findings of Ibrahim (2019), who revealed that 47 percent of the nurses were 31-40 years old with a mean of 31.68 ± 5.92 years. Further, the highest percentage (32.11%) had 1-5 years of experience, and the highest percentage (55.79%) of staff nurses had 1-5 years' experience in the O & G department. It is in contrast to the report of Mansour et al (2020), who found that 50 percent of them had 6 to 10 years of experience with a mean of 8.73 ± 2.81 years. The overall mean was 16.34 ± 3.46 , which is 47 percent in the pre-test, whereas it was 25.78 ± 3.05 , which is 74 percent in the post-test, and the difference is 27 percent. It seems that before intervention, the score was lower in all the areas except preservation of UCBSC. The findings are congruent with those of Mohammed & Sayed (2015), who revealed that 88.7 percent of nurses had poor knowledge before intervention.

The calculated chi-square value shows that there is no significant association between post-test knowledge scores and all selected demographic variables. This shows that VATM was highly effective irrespective of the differences in the demographic characteristics. Findings are contrary to the study by Amira & Sabah (2016), who found that there was a statistically significant correlation between PICU nurses' total awareness with their age as when the age increase the nurses' knowledge will in turn increase.

Study implications: This study has significant implications in nursing practice, administration, education and research.

Recommendation

A comparative study and a true experimental study

can be conducted to assess the knowledge and practice regarding UCB stem cell banking among healthcare professionals.

Conclusion

Most of the staff nurses have average knowledge regarding an umbilical cord blood stem cells banking. The possible reason can be the lack of pre-service and in-service education on stem cells and umbilical cord blood banking. The study recommends formal training of staff nurses regarding UCB stem cell banking.

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Corrigendum

In Jan-Feb 2025 issue of NJI, in the article, *Determinants of Academic Performance among BSc Nursing Students: A Mixed Method Research* by Asha Raj S, Bincy AP, Lakshmi G, Chanlin Chacko, Alina Mannanal Gigi, Jimymol M Gigi & Irin Rose Josey, at page 5, the figures shown under the variable '*Habits of substance abuse*' as printed, are:

No	1	0.4
Yes	227	99.6

This may kindly be read as:

No	227	99.6
Yes	1	0.4