

# A Study to Assess the Knowledge on Umbilical Cord Stem Cell Collection, Preservation and Utilization among Nurses in the Selected Hospitals at Jalandhar, Punjab

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## ABSTRACT

A critical link that supports and nourishes the baby in the womb for 9 months is the umbilical cord and called the life line. After a baby is born and the umbilical cord is cut, some blood remains in the blood vessels of the placenta and the portion of umbilical cord referred to as cord blood. It is the richest source of stem cells that have the potential to treat serious diseases. It is once-in-a-lifetime opportunity to preserve a biological resource that could be lifesaver for child or other family members. Umbilical cord stem cells are highly proliferative and are becoming common therapy for treating a number of diseases and disorders. Nurses are at the forefront of health care delivery and are therefore directly involved in all the processes of stem cell collection, use and also are in close contact with mothers during their pregnancy and delivery. So nurses can counsel them regarding the importance of stem cells. In present study pre-experimental one group pre test post test only design was selected. Convenience sampling technique was used to select 60 nurses working in maternity units. Structured knowledge questionnaire was used collect data on knowledge of umbilical cord stem cell collection, preservation and utilization. Result of study showed that more than half (53.3%) of nurses were in age group of 21-25 years and all (100%) of the nurses were females. Most of the nurses had done General Nursing Midwifery (91.7%). According to clinical experiences it was revealed that (31.7%) had more than 8 years experience in context of previous experiences; nurses (47.7%) had maternity ward and (40%) had labour ward and remain (18.3%) had operation theatre experience. Most of the nurses (61.7%) had mass media exposure from magazines and newspapers. The mean of the knowledge score of post test ( $23.60 \pm 5.016$ ) is higher than pre test ( $13.68 \pm 6.358$ ). There is mean difference of pre test and post test is 9.92. It means the knowledge score increased after structured teaching programme (STP). Here calculated t value ( $14.191$ ) > tabulated t-value (2.00).  $H_0$  rejected as  $t_{cal} 14.191 > t_{tab} 2.00 \infty$  at 5% level of significance.

**Key words:** Umbilical cord, stem cell, cord blood, collection, preservation, utilization, knowledge, nurses.

## INTRODUCTION

The mother is the panacea for all kinds of calamities. The existence of the mother invests one with protection; the reverse deprives one of all protection. There

is no shelter like mother. There is no refuge like the mother. There is no defence like the mother. The act of giving birth is the only movement when both pain and pleasure converge in a moment of time. It is in the

manner of the sharp point of a needle, astride upon that points are both pleasure and pain, simultaneously assailing the female that is undergoing the miracle of childbirth. [1]

Becoming mother is a beautiful and exciting experience for women in her life. [2] The maternal bond between human female and her biological child usually begin to develop during pregnancy. A critical link that supports and nourishes the baby in the womb for 9 months is the umbilical cord. [3] It is called the life line and it is through this cord that the placenta and the fetus are attached to each other. [4] Umbilical cord is the essential vitalizing, direct interlink between a mother and her child, which is always depicted as the blood relationship and an emotional bonding of motherhood. [2]

After a baby is born and the umbilical cord is cut, some blood remains in the blood vessels of the placenta and the portion of umbilical cord remains attached to it. [5] This is referred to as cord blood. This particular blood contains numerous hematopoietic stem cells, which differentiates into other cells and transforms into any organ and the ability to self degenerate. [2]

Twenty years has passed since the first report of a successful cord blood transplant was reported in 1989 in a child with Fanconi's anemia. During these 20 years, the cord blood field has had dramatic growth, with over 400,000 cord blood units donated and stored worldwide for unrelated use. Approximately, 14,000 unrelated cord blood transplants have been performed to date for patients with hematologic malignancies and bone marrow disorders. [6]

The British Broadcasting Corporation (BBC) News (2010): A technique of cord blood stem cell transplant which may eventually remove the need for matched bone marrow transplants has been used in humans for the first time. It is hoped that "master cells" taken from umbilical cords could be used on any patient without rejection. The latest advance, published in the journal nature medicine, greatly

multiplies the tiny number of cells from the cord ready for a transplant. [7]

However, studies have shown that siblings have up to 75% chances of compatibility, and the cord blood may even be a match for parents and grandparents upto 50%. In 1995 a total of 320 centres worldwide had more than 66,000 transplants. [8]

Stem cell transplantation facilities are increasing in India but for optimal utilisation of these facilities, it is important to create concept awareness. At present, lack of awareness about the huge potential to be gained from the storage of cord blood stem cells and highly technical nature of the process is the key reason for a small customer base in the country. [9]

The nurses are in direct contact with the pregnant women during their pregnancy and are in attendance during child's delivery. So they are the one who can create awareness in mothers to donate or store cord blood to protect their child from future ailments. And also nurses are the one who have the important role in collecting the umbilical cord blood after the cord has been isolated from the child and mother. But several misconceptions, ignorance and inadequate knowledge on umbilical cord stem cells are prevalent among the healthcare providers. Thus there is a need to improve the knowledge of the nurses on umbilical cord blood stem cell collection, preservation and utilization.

#### **Objectives:**

1. To assess the pre test knowledge of umbilical cord stem cell collection, preservation and utilization among nurses.
2. To plan and implement structured teaching programme on knowledge of umbilical cord stem cell collection, preservation and utilization among nurses.
3. To assess the post test knowledge of umbilical cord stem cell collection, preservation and utilization among nurses.

4. To compare the pre test and post test knowledge of umbilical cord stem cell collection, preservation and utilization among nurses
5. To find out the association between the knowledge of umbilical cord stem cell collection, preservation and utilization among nurses with selected socio demographic variables.

### Hypothesis:

H<sub>0</sub>: There is no significant difference between pre test and post test knowledge score of nurses.

H<sub>1</sub>: There is a significant difference between pre test and post test knowledge score of nurses.

### MATERIALS AND METHODS

The quantitative research approach was adopted with pre experimental research one group pre test post test only design. The present study population comprised of nurses and the target population was nurses working in maternity units of selected hospitals at Jalandhar city. The sample of the study comprised of 60 nurses who were working in maternity units was recruited as samples who had fulfilled the inclusion and exclusion criteria. Convenience sampling technique was employed to collect data. Ethical clearance was taken from the research and ethical committee of the SGL nursing college, Jalandhar. A written permission was taken from the Principal, SGL nursing college, Jalandhar and Head of OBG department from hospitals for data collection. Research instrument consisted of two parts; part-I Socio-demographic profile and part-II structured knowledge questioners, 30 items of multiple choice questions were used to collect data on knowledge of umbilical cord stem cell collection, preservation and utilization. The criterion measure used in the study was extent of score on level of knowledge. Maximum obtainable score was 30 and divided into four levels like excellent: 23-30, Good: 16-22, Average: 8-15 and Below

average: <8. one mark was given for right answer and zero mark given for wrong answer The research tool and structured teaching programme(STP) were prepared from various review of literature and validated by experts from the field obstetric and gynaecological nursing, pediatric nursing and medical. Prior information and informed consent was obtained from each study sample. Anonymity and confidentiality of sample was maintained. Reliability of the tool was .847 as calculated by Cronbach's Alpha. The data was collected from 15<sup>th</sup> January to 20<sup>th</sup> February 2012. Firstly pre test was taken and STP as intervention was given to nurses. STP was given by lecture method in 45 minute with help of laptop (power-point presentation) and projector. Post test was taken after one week. The data was analyzed using the descriptive and inferential statistics. Analysis was carried out with the help of SPSS version 16.

### RESULTS

Table 1. Frequency and percentage distribution of the Socio Demographic characteristic of nurses. N=60

Sr. No.	Socio-demographic characteristic	f	%
<b>1.</b>	<b>Age (In Years)</b>		
a)	21-25	32	53.3
b)	26-30	5	8.3
c)	31-35	12	20.0
d)	>35	11	18.3
<b>2.</b>	<b>Gender</b>		
a)	Female	60	100.0
b)	Male	00	00
<b>3.</b>	<b>Professional Qualification</b>		
a)	GNM	55	91.7
b)	B.Sc. Nursing	2	3.3
c)	Post Basic B.Sc. Nursing	3	5.0
<b>4.</b>	<b>Clinical Experience(In Years)</b>		
a)	<2	18	30.0
b)	3-5	17	28.3
c)	6-8	6	10.0
d)	>8	19	31.7
<b>5.</b>	<b>Previous experience</b>		
a)	Operation theatre	11	18.3
b)	Maternity ward	25	41.7
c)	Labour room	24	40.0
<b>6.</b>	<b>Mass media Exposure</b>		
a)	Television	11	18.3
b)	Newspaper/magazine	37	61.7
c)	Internet	12	20.0

Table:1 shows that more than half (53.3%) of nurses were in age group of 21-25 years and followed by (20%) were in age group of 31-35 years, (18.3%) were from

more than 35 years age and out of 60 only few were (8.3%) in age 26-30 years. According to gender, all nurses (100%) were females. As per professional qualification; majority of nurses (91.7%) were GNM. According to clinical experiences it was revealed that (31.7%) had more than 8 years experience and followed by (30%) had less than 2 years experience, (28.31%) had 3-5 year & remaining (10%) had 6-8 years experience. In context of previous experiences; nurses (47.7%) had maternity ward and (40%) had labour ward and remain (18.3%) had operation theatre experience. Most of the nurses (61.7%) had mass media exposure from magazines and newspapers.

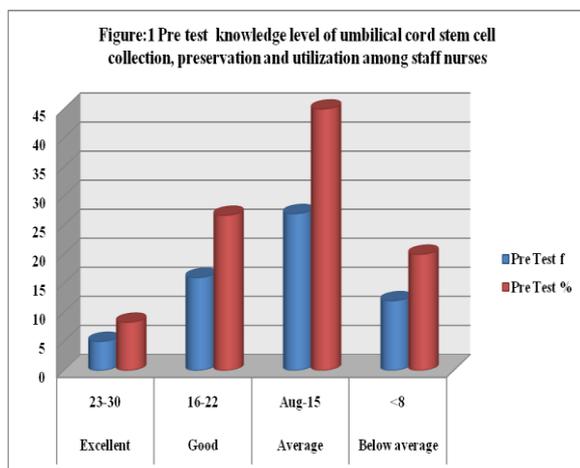


Figure:1 depict that pre test knowledge level of nurses (45%) had average knowledge, followed by (26.7%) had good knowledge, (20%) had below average and only (8.3%) had excellent knowledge regarding umbilical cord stem cell collection, preservation and utilization among nurses.

Figure:2 depict that post test knowledge level of nurses; majority of nurses (65%) had excellent knowledge, followed by (28.3%) had good knowledge, only (6.7%) had average knowledge regarding umbilical cord stem cell collection, preservation and utilization among nurses.

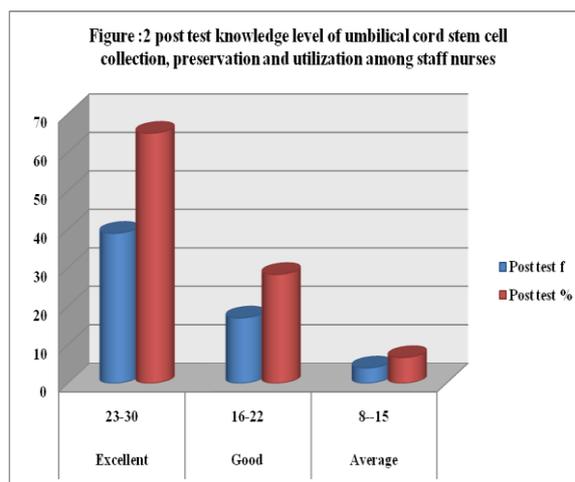


Table: 2 Comparison of the pre test and post test knowledge of umbilical cord stem cell collection, preservation and utilization among nurses. N=60

Test Score	Mean ± SD	MD	t- value	df	p-value
Post test	23.60 ±5.016	9.92	14.191	59	.000**
Pre test	13.68±6.358				

N.B. SD= Standard Deviation, MD= Mean Difference, df= degree of freedom, \*\*= Highly significant (p-value<0.001)

Table:2 shows the mean of the knowledge score of post test (23.60±5.016) is higher than pre test (13.68±6.358). There is mean difference of pre test and post test is 9.92. It means the knowledge score increased after structured teaching programme. Here calculated t value (14.191) > tabulated t-value (2.00).

$H_0$  rejected as  $t_{cal} 14.191 > t_{tab} 2.00$  at 5% level of significance. This indicates that the difference between the pre test and post test mean was a true difference and had not occurred by chance. Thus  $H_1$  is accepted. So there is effectiveness of structured teaching programme on umbilical cord stem cell collection, preservation and utilization among nurses.

Table:3 reflects that, there was a general improvement in all items of knowledge about Introduction of stem cell, collection, preservation, utilization of cord and stem cells among staff nurses after one week structured teaching programme intervention as compared to pre intervention. However, a slight mean score increase in post test after one week.

**Table: 3 Pre test and post test mean subtotal knowledge scores among the nurses N=60**

Sr. No.	Questions	Pre test Knowledge		Post Test Knowledge	
		Mean	SD	Mean	SD
<b>INTRODUCTION OF STEM CELL</b>					
1.	When did take place of stem cell transplantation?	.47	.503	.85	.360
2.	For which disease first successful stem cell transplantation was done ?	.53	.503	.73	.446
3.	Where is the first private stem cell bank of India located ?	.48	.504	.78	.415
4.	What are the stem cells?	.40	.494	.75	.437
5.	What are the types of stem cells on the basis of their sources?	.47	.503	.73	.446
6.	From where somatic stem cells are drawn?	.37	.486	.72	.454
7.	From where embryonic stem cells are derived ?	.53	.503	.85	.360
8.	What are the other name of umbilical cord?	.53	.503	.80	.403
9.	What is the condition where blood remains in the blood vessels of placenta and umbilical cord?	.42	.497	.73	.446
10.	Which of the following cord blood contains numerous amount?	.35	.481	.77	.427
11.	What is the stem cells present in the umbilical cord blood ?	.40	.494	.70	.462
<b>COLLECTION OF UMBILICAL CORD STEM CELLS</b>					
12.	Which type of procedure is umbilical cord stem cell collection?	.47	.503	.70	.462
13.	What are the indications for umbilical cord stem cell collection ?	.52	.504	.67	.475
14.	Is it possible the umbilical cord blood stem cells collection in the case of caesarean?	.38	.490	.78	.415
15.	From which of the following blood vessels cord blood is collected?	.33	.475	.73	.446
16.	Which is the commonly used clinical practice while collecting cord blood?	.45	.502	.78	.415
17.	What is the time limit to collect the cord blood from umbilical cord?	.42	.497	.93	.252
18.	What is the minimum amount of cord blood in the collecting bag?	.53	.503	.83	.376
19.	Which of the following anticoagulant is used to prevent the clotting of cord blood ?	.37	.486	.83	.376
20.	What are the pre-investigation required for mother before preserving cord blood?	.38	.490	.75	.437
21.	What are the test perform Before preserving cord blood ?	.28	.454	.72	.454
<b>UMBILICAL CORD STEM CELLS PRESERVATION</b>					
22.	What is the minimum time for cord blood to be stored at room temperature?	.30	.462	.63	.486
23.	Is the approximately time required to process the umbilical cord stem cells?	.57	.500	.82	.390
24.	What should be the temperature if extracted stem cells are to be stored for long term?	.63	.486	.87	.343
25.	How long the umbilical cord stem cells are viable?	.62	.490	.92	.279
26.	In which gas should be done to storage of umbilical cord stem cells?	.58	.497	.87	.343
27.	Which bank did collect the cord blood free of cost?	.55	.502	.82	.390
<b>UMBILICAL CORD STEM CELLS UTILIZATION</b>					
28.	Which disease can be prevented by umbilical cord stem cells?	.50	.504	.75	.437
29.	What are the advantages of umbilical cord stem cells?	.43	.500	.93	.252
30.	Who can be donor for umbilical cord stem cell?	.42	.497	.85	.360

N.B. SD= Standard Deviation

**Table:4 Association between level of Knowledge in Post Test with selected demographic variables. N=60**

S. No.	Socio-demographic Variables	Knowledge of level in Post Test			$\chi^2$ Value	df	p-value
		Excellent	Good	Average			
<b>1.</b>	<b>Age (In Years)</b>						
a)	21-25	20	10	2			
b)	26-30	3	2	0	4.351	6	.629 <sup>NS</sup>
c)	31-35	9	3	0			
d)	>35	7	2	2			
<b>2.</b>	<b>Professional Qualification</b>						
a)	GNM	36	15	4			
b)	B.Sc. Nursing	1	1	0	.816	4	.936 <sup>NS</sup>
c)	Post Basic B.Sc. Nursing	2	1	0			
<b>3.</b>	<b>Clinical Experience(In Years)</b>						
a)	<2	11	7	0			
b)	3-5	11	4	2	4.021	6	.674 <sup>NS</sup>
c)	6-8	4	2	0			
d)	>8	13	4	2			
<b>4.</b>	<b>Previous experience</b>						
a)	Operation theatre	6	5	0			
b)	Maternity ward	16	7	2	2.830	4	.587 <sup>NS</sup>
c)	Labour room	17	5	2			
<b>5.</b>	<b>Mass media Exposure</b>						
a)	Television	6	5	0			
b)	Newspaper/magazine	26	9	2	4.442	4	.350 <sup>NS</sup>
c)	Internet	7	3	2			

N.B. df=degree of freedom, NS= Non-significant (p-value>0.05)

Table 4 reveals that there was no significant association between level of Knowledge in post test with selected socio-demographic variables because here p-value is  $> 0.05$ .

## DISCUSSION

This study was conducted to assess the effectiveness of STP on knowledge of umbilical cord stem cell collection, preservation and utilization among nurses. The results revealed that pre test knowledge level of nurses (45%) had average knowledge, (26.7%) had good knowledge, (20%) had below average and only (8.3%) had excellent knowledge. In post test knowledge level of nurses (65%) had excellent knowledge, (28.3%) had good knowledge, only (6.7%) had average knowledge regarding umbilical cord stem cell collection, preservation and utilization among nurses. Similar study was conducted by Suen SS, Lao TT, Chan OK, Kou TK (2011) on understanding of commercial cord blood storage at Hongkong. The majority of respondents (78.2%) had no idea that there was the chance of using self-stored stem cells. [10]

The findings of the present study reveal that the mean knowledge scores of post test ( $23.60 \pm 5.016$ ) is higher than pre test ( $13.68 \pm 6.358$ ). There is mean difference of pre test and post test is 9.92. It means the knowledge score increased after structured teaching programme. The findings of present study were in relevance to the study of Sumathy Kumarasamy and P. Muthulakshmi (2010) conducted a study with the objective to assess the nurses' knowledge of umbilical cord stem cell collection, preservation and utilization. Thirty health professionals were involved in the study. The study results showed that post test score (mean:  $39.6 \pm 2.57$ ) was higher than that of pre-test score (mean:  $13.23 \pm 3.88$ ). The study concluded that the STP was effective in enhancing the knowledge with recommendation that a similar study can be replicated in large group to confirm the results of study. [2]

## CONCLUSION

The present study conducted the effectiveness of structured teaching programme on knowledge of umbilical cord stem cell collection, preservation and utilization among nurses. The study found that mean difference of pre test and post test is 9.92. It means the knowledge score increased after structured teaching programme (STP). So, author concluded that advanced effective nursing in service education, communication, and management strategies can help in the improvement of nurses' knowledge for a better health care system.

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**Conflict of interest:** The authors have no conflict of interest to declare.

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