

## Perception of Maternity Nurses Regarding Cord Blood Banking

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### Abstract

**Background:** Umbilical cord blood banking (UCBC) is a novel approach in medical science that has gained attention in recent years. Maternity nurses play a crucial role in the healthcare system, providing care and support to patients throughout their life stages. **Aim:** To assess the perception of maternity nurses regarding cord blood banking. **Design:** A descriptive research design was used. **Setting:** This study was carried out at Rofyda hospital which affiliated to October El-sheikh Zaid, Egypt. **Sample:** all nurses (73 )working at Rofyda Maternity Hospital . **Tools:** Two tools were utilized for data collection. Tool (1) A structured interviewing questionnaire contain demographic characteristics of nurses and knowledge of maternity nurses regarding cord blood banking. Tool (2) Maternity nurses' attitude regarding cord blood banking. **Results:** The present study showed that more than half of maternity nurses had unsatisfactory level of knowledge regarding cord blood banking and less than two third of maternity nurses had negative attitude level regarding cord blood banking. **Conclusion:** The study concluded that there was a highly statistically significant relationship between the demographic characteristics of the studied subjects and their overall level of knowledge and attitude regarding cord blood banking. Additionally, a positive strong correlation was found between the nurses' knowledge and their attitude towards cord blood banking. **Recommendations:** Based on the findings, the study recommends the implementation of in-service educational training programs to improve their knowledge and practice related to umbilical cord blood collection.

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**Keywords:** Cord Blood Banking, Perception, Maternity, Nurses.

### Introduction:

Umbilical cord is the vital direct interlink between mother and fetus, which is always depicted as the relationship of an emotional bonding of motherhood, which is a beautiful experience for a woman. When mother gives birth, the blood that remains in the placenta and umbilical cord is referred as cord blood. This particular blood contains numerous hematopoietic stem cells that have the ability to differentiate into other cells and the ability to self-degenerate (Madhura, 2022). Umbilical cord blood stem cells (UCBSCs) are very much preferred because of the high proliferative potential increased ability for self-renewal, decreased ability for anti gen presentation, and most importantly, safety and ethical free characteristics. On the other hand, adult stem cells, which are found in almost all organs of the postnatal human body, provide an option of endogenous cell source for autologous transplantation, reducing the risk of graft rejection and allergen city problems (Ray & Mukherjee, 2022).

Umbilical Cord Blood Banking (UCBB) is the process of collecting and storing umbilical cord blood, in the immediate period after the birth of a baby (Pisula et al., 2021). Umbilical cord blood can be collected without causing any kind of harm to the mother or infant donor. Unlike embryonic stem cells these are not ethically controversial. As the newborn, is delivered, and the umbilical cord is divided, blood can be collected from the segment of cord still attached to the placenta. Stem cells

retrieved from the blood in the remaining segment of the umbilical cord and placenta (Sahoo & Rana., 2020).

Cord blood is collected by two methods of cord blood collection in practice are in-utero and ex-utero method, ex-utero method is more commonly used. The in-utero method involves the collection of cord blood after the newborn's delivery but before the delivery of placenta, whereas in the ex-utero method it is collected after the delivery of the placenta. Immediately after the newborn's delivery, the umbilical cord is clamped from the newborn and a needle attached to a collection bag pre-coated with anticoagulant is inserted in the umbilical vein (Esmail, Abood, Saed & AbdElmordy, 2022). Maternity nurses are integral part of health care providers in all phases of life. Their role in cord blood collection is concentrated in the preparation, collection, tagging and packing of the blood tube. Nurses have a specified role in patient teaching, as they have a reliable source of health information, so they must be aware of the latest trends in medical diagnosis and treatment. On other hand, continuing education for nurses equip them with a running development, preserve their competence and encounter the standards of nursing practices (Green et al., 2021). Subsequently, the nurses should be educated in regard to the value of collecting and preserving UCB for future use in curing of diseases and creating apposite attitude to modulate the holistic care of nursing care. Nurses played a vital role in carrying out different functions in stem cell banking, right from understanding the structure of the umbilical cord to defining the sides of obtaining stem cells. However, previous studies conducted in Egypt found that most nurses were unaware of cord blood collection and preservation process as well as its uses in medicine (Mansour, Gouda & Ibrahim, 2020).

### Significance of the study:

Umbilical cord blood collection (UCBC) is a new approach in medical science. It is the most innovative technology available internationally to repair the body's failing system; most clients are unaware of this clinical entity Hence, the UCBC is mainly performed by obstetricians, midwives, and nurses trained in that field (Mohammed, Khalil & Mustafa, 2022). There is a total of 720 umbilical cord blood/stem cell banks worldwide, but only 76 of them have obtained accreditation from the American Association of Blood Banks (AABB). Cell Safe Bank is one of the accredited banks. It holds the distinction of being the first stem cell bank in the Middle East and Egypt. In 2009, Cell Safe Bank was granted a license by the Ministry of Health, and it operates using a fully automated system. It holds AABB accreditation internationally (Elemam, Mohamed, Mohamed, Ahmed & Mohamed, 2021). By 2022, over 40,000 umbilical cord blood (UCB) transplantations had been performed worldwide for the treatment of around 80 medical disorders. Approximately 800,000 umbilical cord blood units are stored in public banks worldwide, while more than 4 million units are stored in private banks (Mayani, Wagner & Broxmeyer, 2020). Umbilical cord blood collection is a significant source of stem cells. It treats many diseases in Egypt by transplanting stem cells such as Mediterranean anemia, leukemia, diabetes, and liver cirrhosis due to viral hepatitis (Mansour, Gouda & Ibrahim, 2020). The healthcare team, especially the nurse, is supposed to educate the pregnant women regarding this issue to make an informed decision. Nurses, especially in the maternity field, must be informed about the most modern advances and receive the required training. According to study conducted by (Hassan Ibrahim, Fahmy, Hameed & Fathy, 2022), In a study conducted in Egypt, it was discovered that 63.2% of the nurses examined had incorrect knowledge regarding umbilical cord blood collection. Furthermore, 45.6% of the nurses expressed a positive attitude towards umbilical cord blood collection. Additionally, a study by Moustafa and Youness (2015) revealed that 78.7% of maternity nurses exhibited inadequate knowledge about cord blood banking. According to their perspective, the costs associated with umbilical cord blood banks, as well as the policies and procedures involved, were identified as barriers to implementing this new technology in their hospitals.

### Aim of the Study

This study aimed to assess perception of maternity nurses regarding cord blood banking through the following objectives:

- Assess maternity nurses' knowledge regarding cord blood banking.
- Assess maternity nurses' attitude regarding cord blood banking.

### Research questions:

- What are maternity nurses' knowledge regarding cord blood banking?
- What are maternity nurses' attitude regarding cord blood banking?

**Research design:**

A descriptive design was utilized for conducting this study.

**Setting:**

The study was conducted at Rofyda Maternity hospital which affiliated to October El-sheikh Zaid, Egypt.

**Sample type:**

A Convenient sample was utilized in this study.

**Sample size:**

The study included all maternity nurses working at Rofyda Hospital, which consisted of 73 nurses. Both male and female nurses with varying educational levels were invited to participate in the research.

**Tools for data collection:**

Two tools were used to collect data of this study as follow:

**Tool (I): A Structured interviewing questionnaire:**

This tool adapted from Elmarakby , (2021) to assess the maternity nurse's knowledge regarding to umbilical cord blood banking. **It encompassed of two parts:**

**Part I:** It covers the demographic characteristics of the maternity nurses and it included (7) questions such as age, gender, qualifications, current occupation, years of experience, knowledge regarding cord blood banking, and their source of this knowledge.

**Part II:** The assessment of maternity nurses' knowledge regarding cord blood banking. It was consisted of fifteen questions divided into three sections. Section 1 focused on general knowledge related to the umbilical cord and consisted of (4) questions. These questions covered topics such as the definition of the umbilical cord, the number of blood vessels present, the functions of the umbilical cord, and potential deformities that can occur. Section 2 assessed the knowledge specific to cord blood collection and comprised (6) questions. These questions addressed various aspects, including identifying who is responsible for collecting umbilical cord blood, understanding the source of cord blood, recognizing contraindications for umbilical cord blood collection, understanding the advantages and disadvantages of using umbilical cord blood, and being aware of the diseases that can be treated with it. Section 3 focused on the maternity nurses' knowledge regarding cord blood banking. This section included (5) questions, covering topics such as the definition of cord blood banking, the different types of cord blood banking, the preferred type of banks from the perspective of maternity nurses and the reasons behind their choice, recommended procedures for storing umbilical cord blood, and the barriers to using cord blood banks. Overall, these three sections aimed to comprehensively assess the maternity nurses' knowledge regarding umbilical cord, cord blood collection, and cord blood banking.

**Scoring system:**

The scoring system for this part consisted of 15 questions, covering general knowledge about the umbilical cord, knowledge related to cord blood collection, and knowledge regarding cord blood banking. Each question was assessed using a model key answer, with the following scoring system:

A score of (1) was assigned for a wrong answer or no answer.

A score of (2) was given for an incomplete correct answer.

A score of (3) was awarded for a complete correct answer.

The total knowledge scores ranged from 15 to 45, depending on the number of correct and complete answers provided by the participants. These scores were then summed, and a percentage score was calculated. The percentage score was categorized into three categories to assess the level of knowledge:

**Unsatisfactory knowledge:** Total score less than <50% (15-23).

**Incomplete satisfactory knowledge:** Total score between 50% - <75% (23-34).

**Complete satisfactory knowledge:** Total score equal to or more than  $\geq 75\%$  (34-45).

### **Tool (II): Attitude of maternity nurses regarding umbilical cord blood banking:**

This Likert scale adapted from **Rucinski et al., (2010) & Patyal et al, (2018)** to assess the maternity nurses attitude regarding to umbilical cord blood banking, it consisted of (17) items which divided into two parts:

**Part I :** This part is used to assess attitude of maternity nurses regarding umbilical cord blood banking and it contained (10) items such as (cord blood must be provided for life, it is necessary to store the baby's umbilical cord blood, it is necessary to collect cord blood immediately after birth, cord blood should not only be used for the child and his family, but the preserved cord blood can benefit everyone, obtaining cord blood does not waste time, storing umbilical cord blood does not affect the health, the baby is not harmed, expectant mothers should be advised to store cord blood, everyone can benefit from saved cord blood, using cord blood is safer, family history and sufficient disclosure information should be taken).

**Part II:** This part covered attitude of the maternity nurses regarding considerations and recommendations about umbilical cord blood banking and it contained (7) items such as (informed consent must be obtained to collect, store and use cord blood, the cord blood bank should have clear policies, collecting, storing and using cord blood is consistent with religion, experience is required, cord blood banking should be considered a routine procedure, it is necessary to conduct workshops and training courses for nurses regarding cord blood banking).

### **Scoring system:**

A scoring system to assessed attitude of the maternity nurses regarding cord blood banking; using three Likert scales for assessing data collection, a score of (3) grade was given for agree, a score of (2) grade was given for neutral and a score of (1) grade was given for disagree. The total attitude scores ranged from 17 – 51. These scores were summed and converted into a percentage score.

- **Negative attitude level** if total score <75% (17 - 38).
- **Positive attitude level** if the total score  $\geq$  75 % (38 - 51).

### **Validity:**

The study tools were tested for content and face validity by a jury test of three experts in the field of Maternal and Newborn Health Nursing to evaluate the individual items as well as the entire instrument as being relevant and appropriate to test what they wanted to measure. The face validity of the questionnaire was calculated based on experts' opinions after calculating the content validity index (%) of its items and it was 98%.

### **Reliability:**

A specific measure is reliable if its application on the same object of measurement sometimes produces the same results. It was conducted for the developed tool, to achieve the trustworthiness criteria of the tool reliability. Cronbach Alpha, which is a model of internal consistency, was used in the analysis. To assess reliability, the pilot subjects tested the study tool at the first session for calculating Cronbach's Alpha (Knowledge questionnaire = 0.845, and Attitude= 0.980). The statistical equation of Cronbach's Alpha reliability coefficient normally ranges between 0 and 1 higher value (more than 0.7) denotes acceptable reliability (**Pandey & Pandey, 2021**).

### **Ethical considerations:**

The researcher followed the necessary ethical procedures and obtained the required approvals for the study. Firstly, the researcher obtained approval from the Ethical Committee of the Faculty of Nursing at Helwan University. Subsequently, the researcher sought approval from the Director of Rofyda Maternity Hospital, also the researcher obtained the approval of the Director of Nursing as well. These steps ensured that the study was conducted in accordance with ethical guidelines and had the necessary institutional support. Before initiating the study, the researcher clearly explained the study's objectives and purpose to the participating nurses. The researcher obtained oral consent from the nurses, assuring them that the gathered data would be treated confidentially and used solely for research purposes. The researcher emphasized maintaining the anonymity and confidentiality of the subjects' data throughout the study. Furthermore, the studied nurses were informed of their right to withdraw from the study at any time, ensuring that their participation was voluntary and that they had full control over their involvement. These measures were taken to ensure the ethical conduct of the study and protect the rights and well-being of the participating nurses.

### Pilot study:

A pilot study was conducted on a subset of the subjects under study, specifically 10% of the total sample size, which amounted to 7 nurses. The purpose of the pilot study was to assess the applicability, feasibility, practicability, and clarity of the tools constructed for the research. Furthermore, the pilot study helped estimate the time required for each subject to complete the questionnaire. Based on the results of the pilot study, no items needed to be omitted or removed from the questionnaire. Therefore, the nurses who participated in the pilot study were subsequently included in the final study sample.

### Fieldwork:

- Data were collected through three months, from the beginning of April 2023 to the end of June 2023. The researcher was available in the study setting three days per week throughout the morning shift from 9:00 AM to 1:00 PM.
- Approval was obtained from a scientific, and ethical committee of the Faculty of Nursing at Helwan University, and the study subjects individually gave an agreement to participate in the study.
- Firstly, the researcher met and introduced herself to the nurses with the studied nurses at the previously mentioned settings, explained the purpose of the study after introducing herself, and assessed individually using the previously mentioned tools.
- Participants were informed about voluntary participation, the right to withdraw at any stage of data collection, and their identity should keep confidential.
- After that, nursing staff's demographics and work data questions, nursing staff's knowledge questionnaire sheet regarding cord blood banking, were distributed to all nurses and filled in the presence of the researcher to ensure that the questions were answered completely by the nurse.
- They were delivered tools immediately to the researcher after completion to avoid any biases resulting from the interaction of nurses with each other. The time required to complete the questionnaire was around 30-45 minutes.
- The studied nurses were assured that the information collected would be treated confidentially and that it would be used only for the study.

### Preparatory Phase:

- It included reviewing related literature and theoretical knowledge related to perception of maternity nurses regarding cord blood banking. A review of the current and past available literature in the various aspects of the study using books, articles, the internet, periodicals, and magazines was done. This served to develop the study tools for data collection. During this phase, the researcher also visited the selected place to get acquainted with the personnel and the study setting. The development of the tools was under the supervisor's guidance and experts' opinions were considered.

### Statistical item:

The collected data were organized, tabulated, and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 25, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean, and standard deviation were calculated. For qualitative data, which describe a 13 categorical set of data by frequency, percentage or proportion of each category, comparison between two groups and more was done using Chi-square test ( $\chi^2$ ). Correlation between variables was evaluated using Pearson's correlation coefficient ( $r$ ).

### Result:

**Table (1)** shows demographic characteristics among the studied nurses. It illustrates that more than half (52.1%) of the studied nurses their age ranged between  $20 \leq 30$  years old with a mean age of  $35.3 \pm 9.6$ . Regarding to gender, the majority (86.3%) of them were females. As regard to educational qualifications, more than half (53.4%) of them holding a bachelor's degree while the minority (13.7%) had diploma nursing. In relation to occupation, more than three quarters (76.7%) of them were staff nurses. Concerning years of experience, more than half (56.1%) of them had from  $5 \leq 10$  years with **Mean  $\pm$  SD =  $11.2 \pm 3.7$** . Also, more than two thirds (69.9%) of

them had not information about the cord blood banking while less than one third (30.1%) had information. Moreover, 17.8% of them had the source of information from scientific books and journals.

**Figure (1)** displays the source of information about the cord blood banking among the studied nurses. It found that 17.8% of them had the source of information from scientific books and journals while 12.3% had the source of information from the hospital medical team.

**Table (2)** represents level of knowledge regarding umbilical cord blood banking among the studied nurses. The result revealed that more than two thirds (67.1%) of maternity nurses answered wrong or no answer in relation to the item of contraindications to cord blood collection. While more than one quarter (27.4%) of them had incomplete correct answer in relation to the item of function of the umbilical cord. Also, the results revealed that more than three quarters (76.7%) of them answered complete correct answer in relation to the item of definition of umbilical cord blood. While (5.5%) of them had incomplete correct answer in relation to the item of best types of banks used for storage of umbilical cord blood. Also, the results revealed that more than one quarter (27.4%) of them had complete correct answer in relation to the item of recommended procedures when storing umbilical cord blood.

**Figure (2)** shows level of knowledge regarding barriers to using cord blood banks among the studied nurses. It illustrates that slightly less than two thirds (63.0%) of them choose cost barriers while the minority (4.1%) of them choose parental cultural barriers.

**Figure (3)** displays total level of knowledge of maternity nurses regarding cord blood banking. It clarifies that slightly more than half (50.7%) of maternity nurses had unsatisfactory level of knowledge regarding cord blood banking. While (10.9%) of them had incomplete satisfactory level of knowledge. Moreover, more than one third (38.4%) of them had satisfactory level of knowledge regarding cord blood banking.

**Table (3)** this table pointed to maternity nurses' attitude regarding cord blood banking among studied nurses. It clarifies that more than two thirds (71.2%) of them were disagreed in relation to the item of the use of umbilical cord blood is safer than the use of bone marrow of others. While less than half (47.9%) of them were neutral in relation to the item of it is necessary to store the umbilical cord blood of a neonatal baby. On the other hand, less than two thirds (63.0%) of them were agreed in relation to the item of a family history and adequate information should be taken before collecting umbilical cord blood.

**Table (4)** represents maternity nurses' attitude regarding cord blood banking in relation to consideration and recommendation of umbilical cord blood banking. It demonstrates that more than half (53.4%) of them were disagreed in relation to the items of cord blood collection should be included as routine procedure in delivery rooms. While less than three quarters (74.0%) of them were neutral in relation to the items of collection, storage, and use of umbilical cord consistent with religion. On the other hand, less than two thirds (60.3%) of them were agreed in relation to the item of donor records must be kept confidential.

**Figure (4)** displays total level of attitude of maternity nurses regarding umbilical cord blood banking. It found that nearly two thirds (65.8%) of maternity nurses had negative attitude level regarding cord blood banking. Moreover, more than one third (34.2%) of them had positive attitude level regarding cord blood banking.

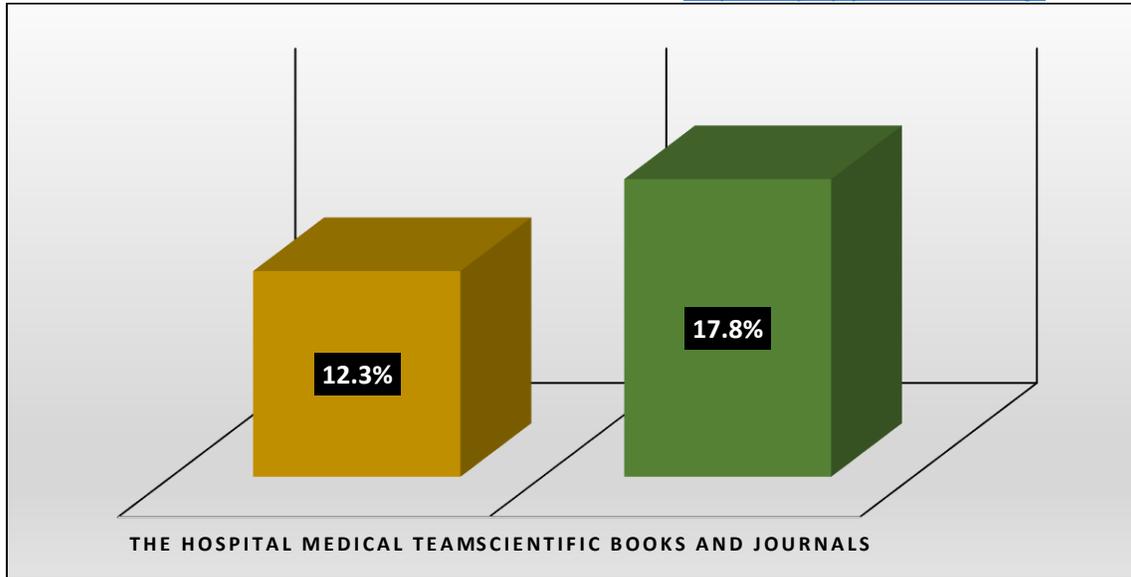
**Table (5)** shows relation between total level of knowledge of maternity nurses regarding cord blood banking and their sociodemographic characteristics. It indicates that, there was a highly statistically significant relation between total level of knowledge of maternity nurses regarding cord blood banking and all sociodemographic characteristics at P-value (0.000\*\*).

**Table (6)** this table reflects the relation between total level of attitude of maternity nurses regarding cord blood banking and their personal characteristics. It indicates that, there was a highly statistically significant relation between total level of attitude regarding cord blood banking and their age, gender, educational qualifications, years of experience and information regarding cord blood banking at P-value (0.000\*\*). While there was a statistically significant relation between occupation of maternity nurses and their total level of attitude regarding cord blood banking at P-value (0.003\*).

**Table (7)** illustrates correlation between total maternity nurses’ knowledge and their attitude regarding cord blood banking. It clarifies that, there was a positive strong highly statistically significant correlation between maternity nurses’ knowledge and their attitude regarding cord blood banking ( $r = 0.86$  &  $P = 0.000^{**}$ ).

**Table (1): Frequency distribution of demographic characteristics among the studied nurses (n = 73).**

Items	N	%	
Age (year)	20 ≤ 30	38	52.1
	31 ≤ 40	25	34.2
	41 ≤ 50	10	13.7
	Mean ± SD	35.3 ± 9.6	
Gender	Male	10	13.7
	Female	63	86.3
Educational Qualifications	Diploma	10	13.7
	Technical Nursing Institute	11	15.1
	Bachelor’s Degree	39	53.4
	Master’s degree	13	17.8
Occupation	Staff nurse	56	76.7
	Head nurse	9	12.3
	Nurse Supervisor	8	11.0
Years of experience	5 ≤ 10	41	56.1
	11 ≤ 15	21	28.8
	> 15	11	15.1
	Mean ± SD	11.2 ± 3.7	
Information about the cord blood banking	Yes	22	30.1
	No	51	69.9

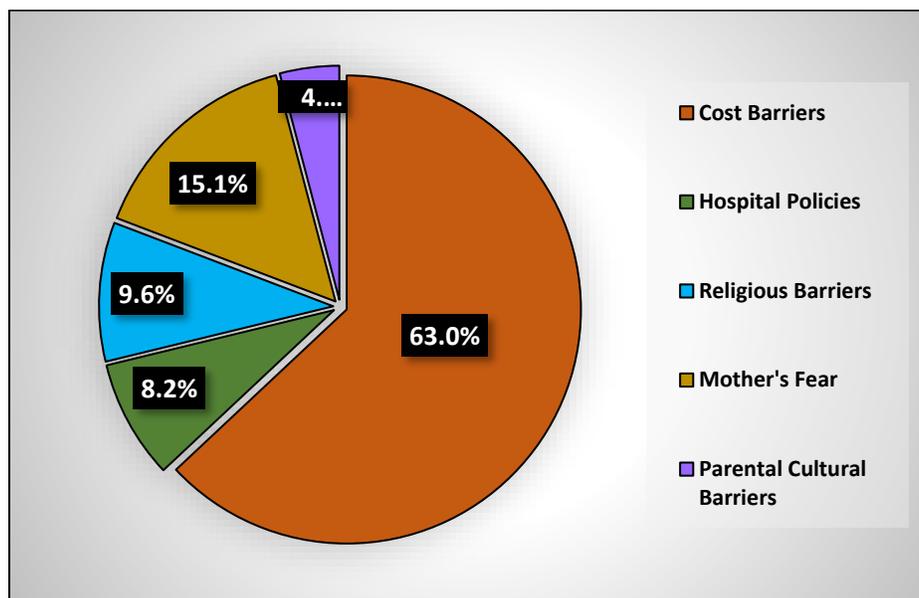


**Figure (1):** Percentage distribution of the source of information about the cord blood banking among the studied nurses.

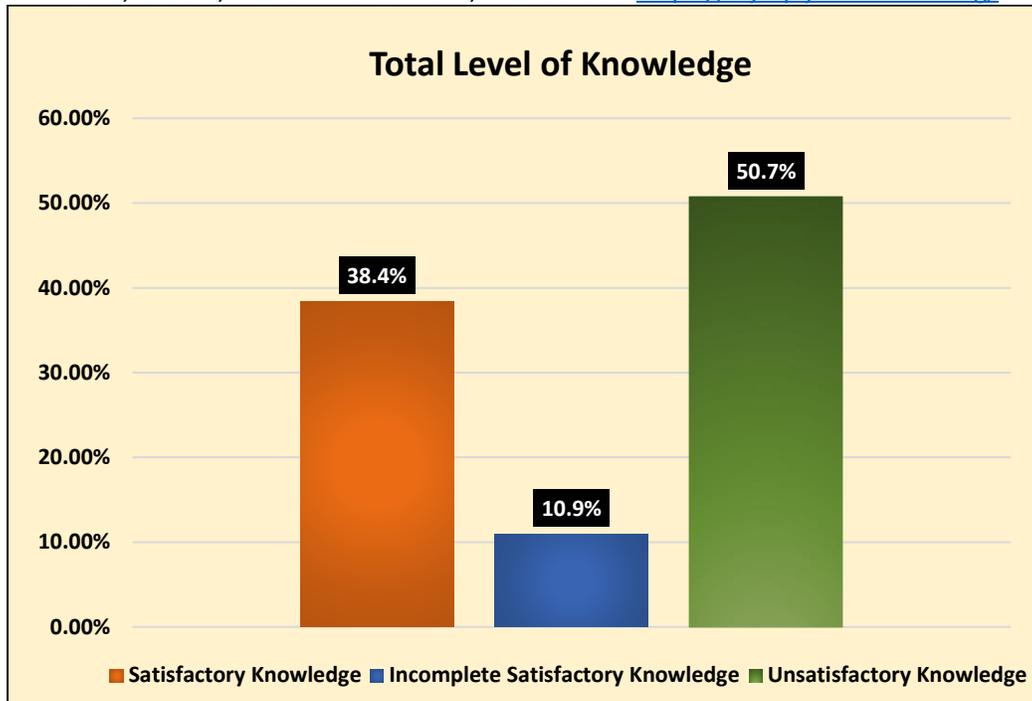
**Table (2):** Frequency distribution of level of knowledge regarding cord blood banking among the studied nurses (n = 73).

Items	Complete correct answer		Incomplete correct answer		Wrong or no answer	
	N	%	N	%	N	%
<b>• General knowledge regarding umbilical cord :</b>						
Definition of umbilical cord blood.	56	<b>76.7</b>	10	13.7	7	9.6
Blood vessels number in the umbilical cord.	52	71.2	11	15.1	10	13.7
Function of the umbilical cord.	40	54.8	20	<b>27.4</b>	13	17.8
Deformities of the umbilical cord.	33	45.2	10	13.7	30	41.1
<b>• knowledge regarding cord blood collection:</b>						
Who is responsible about collecting umbilical cord blood.	35	47.9	17	23.3	21	28.8
Source of umbilical cord blood collection.	15	20.5	7	9.6	51	69.9
Advantages of using umbilical cord blood.	23	31.5	11	15.1	39	53.4

Disadvantages of using umbilical cord blood.	31	42.5	2	2.7	40	54.8
Contraindications to cord blood collection.	21	28.8	3	4.1	49	<b>67.1</b>
Diseases that can be treated with existing umbilical cord cells.	24	32.9	8	11.0	41	56.1
<b>• Knowledge regarding cord blood :</b>						
Definition of umbilical cord blood banking.	19	26.0	3	4.1	51	69.9
Types of banks used for storage of umbilical cord blood.	14	19.2	1	1.3	58	<b>79.5</b>
Best types of banks used for storage of umbilical cord blood.	12	16.4	4	<b>5.5</b>	57	78.1
Recommended procedures when storing umbilical cord blood.	20	<b>27.4</b>	6	8.2	47	64.4



**Figure (2):** Percentage distribution of level of knowledge regarding barriers to using cord blood banks among the studied nurses.



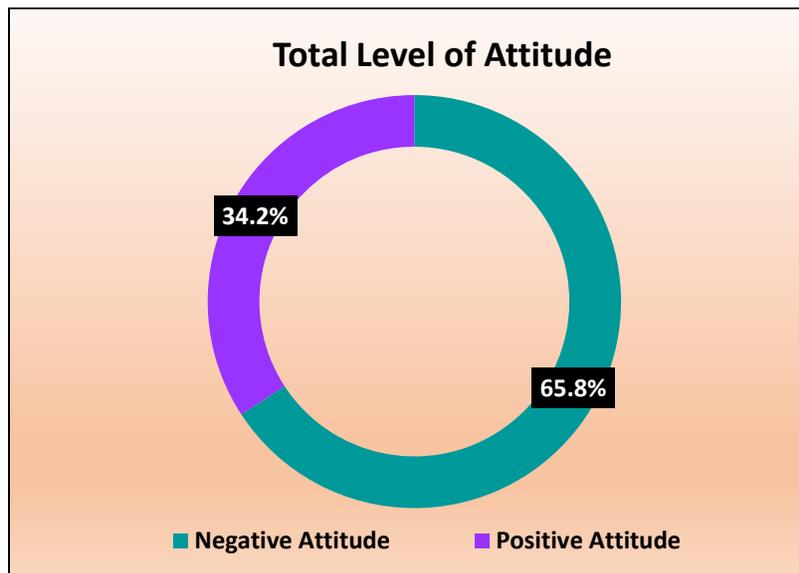
**Figure (3):** Percentage distribution of total level of knowledge of maternity nurses regarding cord blood banking.

**Table (3):** Frequency distribution of maternity nurses' attitude regarding cord blood banking among studied nurses (n = 73).

Items	Agree		Neutral		Disagree	
	N	%	N	%	N	%
Cord blood should be available for life.	27	37.0	33	45.2	13	17.8
It is necessary to store the umbilical cord blood of a neonatal baby.	25	34.3	35	47.9	13	17.8
It is necessary to collect umbilical cord blood immediately after birth.	36	49.3	20	27.4	17	23.3
The umbilical cord blood should not be used only for the baby and his family, but the preserved cord blood can benefit everyone.	10	13.7	22	30.1	41	56.2
Obtaining umbilical cord blood does not waste time during childbirth.	11	15.1	19	26.0	43	58.9
Umbilical cord blood collection does not affect the health of the mother or baby.	21	28.8	25	34.2	27	37.0
The baby is not harmed at all when taking umbilical cord blood.	9	12.3	18	24.7	46	63.0
Pregnant mothers should be advised to store umbilical cord blood.	17	23.3	27	37.0	29	39.7
The use of umbilical cord blood is safer than the use of bone marrow of others.	13	17.8	8	11.0	52	71.2
A family history and adequate information should be taken before collecting umbilical cord blood.	46	63.0	20	27.4	7	9.6

**Table (4):** Frequency distribution of maternity nurses' attitude regarding cord blood banking in relation to consideration and recommendation of umbilical cord blood banking (n = 73).

Items	Agree		Neutral		Disagree	
	N	%	N	%	N	%
Informed consent must be obtained to collect, store and use of cord blood.	41	56.2	23	31.5	9	12.3
Donor records must be kept confidential.	44	60.3	19	26.0	10	13.7
Umbilical cord blood bank must have clear policies.	30	41.1	32	43.8	11	15.1
Collection, storage, and use of umbilical cord consistent with religion.	15	20.5	54	74.0	4	5.5
Experiences and competencies are required to collect and keep cord blood.	24	32.9	37	50.7	12	16.4
Cord blood collection should be included as routine procedure in delivery rooms.	20	27.4	14	19.2	39	53.4
It is necessary to conduct workshops and training courses for nursing regarding umbilical cord blood banks.	36	49.3	18	24.7	19	26.0



**Figure (4):** Percentage distribution of total level of attitude of maternity nurses regarding cord blood banking.

**Table (5): Relation between nurses' total level of knowledge of maternity nurses and their demographic characteristics (n = 73).**

Items		Total level of knowledge						$\chi^2$	P-Value
		Satisfactory		Incomplete satisfactory		Un-satisfactory			
		N	%	N	%	N	%		
		28	38.4	8	10.9	37	50.7		
Age	▪ 20 ≤ 30	20	27.4	3	4.1	15	20.5	65.4	0.000**
	▪ 31 ≤ 40	5	6.9	3	4.1	17	23.3		
	▪ 41 ≤ 50	3	4.1	2	2.7	5	6.9		
Gender	▪ Male	3	4.1	2	2.7	5	6.9	18.6	0.000**
	▪ Female	25	34.2	6	8.2	32	43.9		
Educational Qualifications	▪ Diploma	5	6.9	3	4.1	2	2.7	54.8	0.000**
	▪ Technical	3	4.1	2	2.7	6	8.2		
	▪ Bachelor	14	19.2	1	1.4	24	32.9		
	▪ Master	6	8.2	2	2.7	5	6.9		
Occupation	▪ Staff nurse	16	21.9	6	8.2	34	46.5	21.6	0.000**
	▪ Head nurse	7	9.6	1	1.4	1	1.4		
	▪ Supervisor	5	6.9	1	1.4	2	2.7		
Years of experience	▪ 5 ≤ 10	13	17.8	7	9.6	21	28.8	55.4	0.000**
	▪ 11 ≤ 15	12	16.4	0	0.0	9	12.3		
	▪ > 15	3	4.1	1	1.4	7	9.6		
Information about the cord blood banking	▪ Yes	20	27.4	1	1.4	1	1.4	50.6	0.000**
	▪ No	8	10.9	7	9.6	36	49.3		

\*Significant  $p \leq 0.05$

\*\*Highly significant  $p \leq 0.001$

**Table (6):** Relation between nurses' total level of attitude and their demographic characteristics (n = 73).

Items		Total level of attitude				$\chi^2$	P-Value
		Positive		Negative			
		N	%	N	%		
		25	34.2	48	65.8		
Age	▪ 20 ≤ 30	15	20.5	23	31.5	35.0	0.000**
	▪ 31 ≤ 40	4	5.5	21	28.8		
	▪ 41 ≤ 50	6	8.2	4	5.5		
Gender	▪ Male	3	4.1	7	9.6	22.2	0.000**
	▪ Female	22	30.1	41	56.2		
Educational Qualifications	▪ Diploma	3	4.1	7	9.6	57.0	0.000**
	▪ Technical	5	6.9	6	8.2		
	▪ Bachelor	12	16.4	27	37.0		
	▪ Master	5	6.9	8	10.9		
Occupation	▪ Staff nurse	15	20.5	41	56.2	11.5	0.003*
	▪ Head nurse	4	5.5	5	6.9		
	▪ Supervisor	6	8.2	2	2.7		
Years of experience	▪ 5 ≤ 10	11	15.1	30	41.1	29.7	0.000**
	▪ 11 ≤ 15	13	17.8	8	10.9		
	▪ > 15	1	1.4	10	13.7		
Information about the cord blood banking	▪ Yes	20	27.4	2	2.7	60.5	0.000**
	▪ No	5	6.9	46	63.0		

\*Significant  $p \leq 0.05$

\*\*Highly significant  $p \leq 0.001$

**Table (7):** Correlation between total maternity nurses' knowledge and their attitude (n = 73).

Items	Total knowledge	
	R	P
Total attitude	0.86	0.000**

\*Significant  $p \leq 0.05$

\*\*Highly significant  $p \leq 0.001$

**Discussion:**

The nurses especially in maternity field have to be informed about the most modern advances and receive the required training. So that, increase the level of awareness regarding cord blood banking and its barriers among the staff nurses and accept a positive attitude will help in developing cord blood banking as an essential aspect of Egyptian healthcare team (**Mansour et al., 2020**). So, the aim of this study to assess perception of maternity nurses regarding cord blood banking. Discussion of the current study was categorized into the following parts: Part (I) demographic characteristics of the studied nurses. Part (II) knowledge of maternity nurses regarding cord blood banking. Part (III) maternity Nurses attitude regarding cord blood banking Part (IV) additional and correlational findings between variable under the study.

Regarding the demographic characteristics of the studied nurses, the present study found that more than half of them fell within the age range of 20 to 30 years, with a mean age of  $35.3 \pm 9.6$ . The majority of the nurses were female and held positions as staff nurses. In terms of educational qualifications, more than half of the participants had obtained a bachelor's degree. These findings are consistent with a study by **Elmarakby et al. (2020)**, which investigated the effects of an educational program on maternity nurses' knowledge and attitudes about umbilical cord blood banking and its barriers at Obstetrics and Gynecological departments at Banha University Hospital, which found that more than half of the sample fell within the age group of 25 to 30 years, with a mean age of  $31.95 \pm 6.81$  years. Furthermore, these results align with a study conducted by **Esmail et al. (2022)** titled "Assessment of Knowledge and Attitude of Maternity Nurses Regarding Umbilical Cord Stem Cells Collection and Banking" at the obstetrics & gynecological department at Banha University Hospital, Egypt, which found that the majority of nurses worked as bedside nurses. However, these findings differ from those of **Mansour et al. (2020)**, who investigated the effects of an educational program on nurses' knowledge and attitudes regarding umbilical cord-blood stem cells preservation at Obstetrics and Gynecological departments, reported that almost half of the participants held a nursing diploma.

**Concerning years of experience**, the present illustrated that less than two thirds of the studied nurses had from  $5 \leq 10$  years with Mean  $\pm$  SD =  $11.2 \pm 3.7$ . This result come in agreement with **Peberdy et al., (2021)** who study Australian maternity healthcare professionals' knowledge, attitudes, and practices relevant to cord blood banking, donation, and clamp timing: A cross-sectional survey and established that represented the majority of studied nurses had more than five years of experience. Moreover, the study finding was inconsistent with the study result carried by **David et al., (2023)** who make a pre-experimental study to assess the effectiveness of structured teaching Programme on knowledge regarding stem cells and umbilical cord blood banking among staff nurses of selected private hospitals of Davangere, Karnataka, India and founded the majority of studied nurses had less than five years of experience.

**In terms of maternity nurses' source of information about cord blood banks**, the present study revealed that less than three quarters of the participants lacked information about cord blood banks, while less than one third of them possessed such information. Furthermore, less than one quarter of the nurses obtained their information from scientific books and journals. These findings are consistent with a study conducted by **Lee et al. (2019)**, which investigated the knowledge, attitudes, and practices of urban Chinese midwives regarding umbilical cord blood donation in Hong Kong, China. The study showed that approximately one-third of Hong Kong midwives provided information about cord blood banks.

**In the context of maternity nurses' general knowledge about the umbilical cord**, the current study demonstrates that over three quarters of them provided complete and accurate responses regarding the definition of umbilical cord blood. However, more than a quarter of the participants provided incomplete correct responses concerning the function of the umbilical cord. This finding aligns with a study by **Mansour et al. (2020)**, which investigated the impact of an educational program on nurses' knowledge and attitudes regarding the preservation of umbilical cord blood stem cells at Mansoura University Hospital. The majority of nurses in that study correctly answered questions related to the definition of the umbilical cord, but a significant portion of them exhibited misconceptions regarding contraindications to cord blood collection.

**In relation to the level of knowledge regarding cord blood banking**, the current study found that the majority of maternity nurses either provided incorrect or no answers regarding the types of banks used for umbilical cord blood storage. Additionally, the results indicated that more than one quarter of the participants provided complete and accurate answers regarding the recommended procedures for storing umbilical cord blood. These findings are consistent with a study conducted in Egypt by **Ibrahim et al. (2022)**, titled "Assessment of Knowledge and Attitude of Maternity Nurses Regarding Cord Blood Collection" at Ain Shams University Maternity Hospital. The study revealed that less than two third of the nurses surveyed correctly answered questions about recommended procedures, while more than one third of them provided incorrect responses regarding the best types of banks for umbilical cord blood storage.

**Regarding the level of knowledge of maternity nurses regarding cord blood collection**, the present study illustrated that more than two-thirds of maternity nurses had wrong or no answer about the item of contraindication to cord blood collection. This result comes in the same line with **Mansour et al., (2020)** who studied the "Effect of an Educational Program on Nurses Knowledge and Attitudes Regarding Umbilical Cord-blood Stem Cells Preservation" at Mansoura University Hospital and found that the majority of the studied nurses answered correctly with umbilical cord definition and three quadrants of them had wrong with the item of contraindications to cord blood collection. On the other hand, this result is not in the same line with **Madhura, (2022)** who reported in a published study titled "Impact of an educational intervention on maternity nurses' knowledge regarding process of umbilical cord blood collection" at SVS Hospital, Mahabubnagar, Telangana, India between January 2022 to June 2022 and founded that most of the participants had correct answer with the item of contraindications to cord blood collection.

**Regarding to total level of knowledge of maternity nurses regarding cord blood banking**, the present study clarified that more than half of maternity nurses had unsatisfactory level of knowledge regarding cord blood banking. regarding cord blood banking. This result was supported with **Madhura, (2022)** who studied the impact of an educational intervention on maternity nurses' knowledge regarding process of umbilical cord blood collection at SVS Hospital, Mahabubnagar, Telangana, India between January 2022 to June 2022, revealed that the studied nurses had poor knowledge about cord blood collection and stem cells before the educational intervention. Also the finding supported by **David et al., (2023)** who make a pre-experimental study to assess the effectiveness of structured teaching Programme on knowledge regarding stem cells and umbilical cord blood banking among staff nurses of selected private hospitals of Davangere, Karnataka, India and founded after graduation nurses neglect reading updating their professional knowledge and the knowledge score increased after the structured teaching Programme that done. Moreover, the study finding was contradicted with the study result with **Lee et al., (2019)** who studied Urban Chinese midwives' knowledge, attitudes, and practices toward umbilical cord blood donation at Hong Kong, China. And illustrated that Hong Kong midwives generally had high levels of knowledge about the medical uses of cord blood, but they were not as familiar with the administrative, legal, and financial aspects of donation and storage. From the perspective of researchers, these findings may be explained by the emergence of cord blood collection and banking as advanced practices in the maternity field, while the nursing curriculum in Egypt often overlooks this topic. Additionally, after graduation, nurses may fail to engage in ongoing professional development, partly due to a lack of motivation and increased workload, which can impede their ability to stay updated on umbilical cord-related knowledge. Therefore, there is a pressing need for continuous training initiatives to ensure that all nurses possess sufficient expertise in this area.

Regarding barriers to using cord blood banks, the present study revealed that less than two-thirds of them identified cost barriers as the primary obstacle. Conversely, a minority cited parental cultural barriers. These findings align with those of a study by **Yadav et al. (2022)**, which examined awareness and practice regarding the banking and collection of umbilical cord blood stem cells among nursing officers. That study similarly found that the majority of nurses perceived cost barriers as the main obstacle to using cord blood banks, while only a minority identified parental cultural barriers.

**Concerning maternity nurses' attitude regarding cord blood banking**, the present study clarified that more than two thirds of the studied nurses were disagreed in relation to the item of the use of umbilical cord blood is safer than the use of bone marrow of others. While less than half of them were neutral in relation to the item it is necessary to store the umbilical cord blood of a neonatal baby. On the other hand, less than two thirds of them were agreed in relation to the item of a family history and adequate information should be taken before collecting umbilical cord blood. **In addition to** more than half of maternity nurses were disagreed in relation to the item of cord blood collection should be included as routine procedure in delivery rooms. While less than

Vol. 3, Issue 5, Month: March 2024, Available at: <https://hijnrp.journals.ekb.eg/>

three quarters of them were neutral in relation to the items of collection, storage, and use of umbilical cord consistent with religion. On the other hand, less than two thirds of them were agreed in relation to the item of donor records must be kept confidential. This finding goes on the same line with **Elmarakby et al., 2020** who study effect of an educational program on maternity nurses' knowledge and attitude about umbilical cord blood banking and its barriers at Obstetrics and Gynecological departments at Banha University Hospital and revealed that the majority of studied nurses were disagreed in relation to cord blood collection should be included as routine care in delivery rooms and the use of umbilical cord blood is safe. **From the researcher's point of view**, one possible explanation for the observed results is that the high costs and specialized skills required for cord blood collection and banking may be contributing factors. Cord blood collection and banking is a relatively new procedure that involves the extraction, processing, and storage of umbilical cord blood for potential future use in medical treatments. This process requires trained professionals who are skilled in obtaining the cord blood and ensuring its safe storage. Additionally, the equipment and materials used in cord blood banking can be expensive, which can increase the overall cost of the procedure. These factors may contribute to the relatively low uptake of cord blood banking, which could explain the results observed in this case. On the other hand, this result was disagreed with **Gupta et al., (2019)** who study "Cord Blood Banking: Antenatal Care Provider's Roles and Responsibilities" and reported that more than half felt that umbilical cord blood banking must be recommended to all expectant parents but the majority of studied nurses declared that they were not aware of the international guidelines on umbilical cord blood banking collection and banking and have not received any training directed towards it.

**Regarding the relation between total level of knowledge of maternity nurses regarding cord blood banking and their demographic characteristics**, the present study indicated that, there was a highly statistically significant relation between total level of knowledge of maternity nurses regarding cord blood banking and their all-demographic characteristics at P-value (0.000\*). This finding approved by Chauhan, (2021) who assess the level of knowledge regarding umbilical cord stem cell banking among staff nurses at selected Hospitals of Haridwar Utrakhnad and found there was a highly statistically significant relation between demographic characteristics of studied nurses and their total level of knowledge regarding cord blood banking.

From the researchers' point of view, this result could be due to the impact of the age of nurses, education level, and work experience on their willingness to update knowledge regarding umbilical cord blood banking and its applications in medicine. Conversely, these findings diverge from those of **Samuel (2019)**, who evaluated the effectiveness of a structured teaching program on knowledge regarding cord blood banks among third-year diploma students in general nursing and midwifery at selected schools of nursing in Tamil Nadu. Samuel's study indicated that there was no statistically significant relationship between the demographic characteristics of the studied nurses and their overall level of knowledge regarding cord blood banking.

**In relation to total level of attitude of maternity nurses regarding umbilical cord blood banking**, the present study founded that nearly two-thirds of maternity nurses had negative attitude level regarding cord blood banking. Moreover, more than one third of them had positive attitude level regarding umbilical cord blood banking. This result come in the same line with **Esmail et al., (2022)** who reported in published study "entitled Assessment of Knowledge and Attitude of Maternity Nurses regarding Umbilical Cord Stem Cells Collection and Banking" conducted at obstetrics & gynecological department at Banha University hospital, Egypt, and founded that the majority of the studied nurses had negative attitude level regarding cord blood banking.

The researchers have identified a significant correlation between nurses' knowledge and their attitude towards cord blood banking. This correlation suggests that the lack of knowledge among maternity nurses regarding cord banking, inadequate continuous training and guidance from supervisors, and insufficient teaching and training specifically focused on cord blood banking might contribute to these results. Additionally, it is worth noting that the collection and banking of cord blood were typically conducted by specialized medical companies, with limited involvement of the nursing staff in the actual process.

**The researcher' point of views** is supported by the result finding was compatible with **Ibrahim et al., (2022)** who conducted study entitled "Assessment of Knowledge and Attitude of Maternity Nurses Regarding Cord Blood Collection" at Ain Shams University Maternity Hospital and illustrated that lack of teaching and training on cord blood banking affect nurses attitude level regarding cord blood banking.

Moreover, the study finding was inconsistent with the study result carried by **Yadav et al., (2022)** who assess "knowledge and attitude among college students toward umbilical cord blood and its banking" and illustrated that the majority of the studied sample had moderate knowledge and maximum had neutral attitude on umbilical cord blood and umbilical cord blood banking, which is a good source of hematopoietic stem cells and progenitor cells.

**Concerning relation between total level of attitude of maternity nurses regarding cord blood banking and their demographic characteristics**, the present study indicated that, there was a highly statistically significant relation between total level of attitude regarding cord blood banking and their demographic characteristics at P-value (0.000\*\*). While there was a statistically significant relation between occupation of maternity nurses and their total level of attitude regarding cord blood banking at P-value (0.003\*). This finding approved by **Velikonja et al., (2021)** who reported in a cross-sectional study that was conducted with an online survey (n = 408) using the snowball method to study knowledge, awareness, and attitudes toward umbilical cord blood biobanking between doctors, nurses, or physiotherapists and illustrated that there was a statistically significant relation between demographic characteristics of studied subjects and their total level of attitude regarding cord blood banking.

Also, this finding comes in the same line with **Shaban et al., (2019)** who conducted study entitled "Effect of an Educational Program on Perception and Practices of Nursing Students Regarding the Cord Blood Collection Technique and Stem Cells", it was carried out in Obstetrics and Gynecological departments (antenatal, postnatal, and operating room) at Banha University Hospital, and illustrated that there was a highly statistically significant relationship between total attitude score of the surveyed nurses and their socio-demographic characteristics (age, educational qualification, and occupation) at pre-intervention phase ( $p \leq 0.001$ ). On the other hand, the study finding was inconsistent with **Peberdy et al., (2021)** who conducted study entitled "Australian maternity healthcare professionals' knowledge, attitudes and practices relevant to cord blood banking, donation and clamp timing: A cross-sectional survey", and illustrated that there was negative significant relation between demographic characteristics of studied subjects and their total level of attitude regarding cord blood banking. **From the researchers' point of view**, it is possible that the outcome of the study can be attributed to the fact that the majority of participants were female. Females, in general, have shown a tendency to hold a positive attitude towards cord blood banking. This could be a potential explanation for the observed trend in the results.

**Concerning correlation between total maternity nurses' knowledge and their attitude regarding cord blood banking**, the present study clarified that, there was a positive strong highly statistically significant correlation between maternity nurses' knowledge and their attitude regarding cord blood banking at ( $r = 0.86$  &  $P = 0.000$ \*\*). In the same line, result finding was *compatible* with **Alzahrani et al., (2023)** who conducted study entitled "Improving awareness among health science college students regarding stem cell transplantation and donation willingness" at the faculty of nursing and faculty of applied medical sciences affiliated to Northern Border University, Arar, Saudi Arabia (KSA), and illustrated that highly positive correlation between knowledge and attitude before and after the implantation of the educational module. *On the same line*, the study finding was in a harmony with **Elmarakby et al., 2020** who study "the effect of an educational program on maternity nurses' knowledge and attitude about umbilical cord blood banking and its barriers" at Obstetrics and Gynecological departments at Banha University Hospital and revealed that there was a positive highly statistically significant correlation between total knowledge score and total attitude score at pre and immediate post program. **From the researchers' point of view**, as nurses' knowledge expands, it influences their attitudes towards cord blood banking, leading to a greater understanding and a proactive approach in overcoming existing challenges. Given that nurses constitute the largest group of healthcare professionals involved in this area, it is crucial for them to possess comprehensive information and expertise, enabling them to effectively promote cord blood banking. To foster the right attitude towards this practice, nurses should acquire adequate knowledge and skills through practical training and ongoing education. On other hand, the study finding was inconsistent with **Shaban et al., (2019)** who reported in a conducted study entitled "Effect of an Educational Program on Perception and Practices of Nursing Students Regarding the Cord Blood Collection Technique and Stem Cells" and found that there were no significant differences with a positive correction between the total knowledge score, total attitude score throughout the periods of the study.

In conclusion, there is a pressing requirement to enhance the knowledge and attitude of nurses towards umbilical cord blood banking. This can be achieved through various means such as leveraging mass media platforms, implementing additional educational initiatives, and incorporating relevant content into university and pre-university curricula. It is also crucial to ensure that maternity nurses stay updated on the latest trends and advancements in the field of maternity care. By equipping nurses with accurate and up-to-date information, they can effectively educate parents and contribute to the integration of cord blood banking as an essential component of the Egyptian healthcare system.

### Conclusion :

**In the light of the results of the current study, it can be concluded that:**

More than half of maternity nurses had unsatisfactory level of knowledge regarding cord blood banking and slightly less than two thirds of them had negative attitude level regarding cord blood banking. Furthermore, there was a highly statistically significant relation between socio-demographic characteristics of studied nurses and their total level of knowledge, while, there was a highly statistically significant relation between socio-demographic characteristics of studied nurses and their total level of attitude regarding cord blood banking, and there was a positive strong highly statistically significant correlation between maternity nurses' knowledge and their attitude regarding cord blood banking.

### Recommendations :

**Based on the findings of this study, the following recommendations were suggested:**

#### At the educational level:

- Integrate the umbilical cord blood banking and cord tissue as a new technological advancement in the nursing curriculums.
- Workshops and seminars need to be conducted as educational initiatives to promote awareness on Umbilical Cord Blood Banking and clarify the benefits of different types of Umbilical Cord Blood banking.
- Booklet regarding cord blood banking should be available in Obstetrics and Gynecological departments to be accessible to all nursing staff.

#### At the practical level:

- Provide comprehensive training for nurses on cord blood banking processes.

#### At the research level:

- Implementation of in-service educational training programs to improve their knowledge and practice related to umbilical cord blood collection.
- Further studies are required to identify and investigate maternity nurses' concerns regarding their practice of umbilical cord blood collection technique.
- Replication of the study on large sample size in different setting for generalizing the findings.

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Vol. 3, Issue 5, Month: March 2024, Available at: <https://hijnrp.journals.ekb.eg/>

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