

Assessment of Pregnant Women knowledge and attitude towards Umbilical Cord Banking and Stem Cell.

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Abstract

Background: Nowadays, the collection of stem cells from the blood of the umbilical cord is one of the most important topics of health sciences and new technology. However, cord blood is now considered a rich source of adult stem cells that can be used to treat many conditions and diseases. It is still a controversial topic. The current study **aims** to assess pregnant women's knowledge and attitude toward umbilical cord banking and stem cell. **Research design:** Descriptive exploratory research design was adopted to achieve the aim of the study. **Setting:** The study was conducted at the obstetrics & gynecology outpatient clinic at Beni-Suef University hospital in Egypt. **Subjects:** A convenient sample of 200 pregnant women was recruited. **Tools of data collection:** three tools were used for this study (1) Maternal structured interviewing questionnaire and (2) knowledge assessment questionnaire and (3) attitude assessment questionnaire. **Results:** It was found that 42.5% had an average level of knowledge regarding cord blood banking and stem cell with the negative attitude (67%) with no statistically significant difference ($p > 0.05$). Besides, the sources of information were social media followed by nurses/ midwives. **Conclusion:** The present study concluded that despite nearly half of the pregnant women had average level knowledge but the majority of them had a negative attitude toward umbilical cord blood banking and stem cell. **Recommendations:** adequately planned in-service training programs related to cord blood collection and stem cells established to distribute among the pregnant women who attending the antenatal clinics.

Keywords: pregnant women- awareness - umbilical cord banking and stem cell.

Introduction

Consanguineous marriages have been practiced since the early existence of modern humans. At present, 20% of the world's populations lives in communities with a preference for consanguineous marriage. Consanguinity rates vary from one population to another depending on religion, culture, and geography. Many Arab countries display some of the

highest rates of consanguineous marriages. The prevalence of consanguineous unions also varies by place of residence in Egypt. It ranges from 25.4% in Lower Egypt to 55.2% in Upper Egypt (Anwar, Khyatti, and Hemminki, 2014).

According to data of the Catalogue of Transmission Genetics in Arabs database on genetic disorders in Arab populations, there is a relative abundance

of recessive disorders in the Middle Eastern and North African regions relating to the practice of consanguinity. Thalassemia's and sickle cell diseases/anemia constitute the most common inherited recessive disorders globally and they are common in North Africa, but with immigration, they have spread to Europe and to other parts of the world, which is a common phenomenon in Egypt (**Bittles, & Black, 2010**).

Hematopoietic stem cell transplantation (HSCT) is currently considered the standard of care for many hematological disorders. However, this treatment modality requires tremendous resources. Performing HSCT procedures in developing countries (where many patients have low socioeconomic standards) usually encounters financial, ethical, technological, administrative, and medico-legal challenges. In Egypt, there are fifteen transplant centers, and the transplant rate/million is 8.4, which is considerably higher than the number we reported previously in 2008, where the transplant rate/million was 2.8 (Mahmoud et al., 2008). We are still far away from western standards, where transplant rates are between 36-40 /million.

According to **Saleh, (2019)** source of stem cells for the treatment of over eighty diseases, including blood myelomas, cell disorders, immune system deficiencies, lymphomas, genetic disorders, and leukemia (**Saleh, 2019**). Furthermore, a cord blood bank is used for storing UCB for future use. In response to the chance of using cord blood in treating diseases of the blood and immune systems, both private and public cord blood banks are developed (**Armstrong, et al., 2018**). Likewise, UCB are often collected without danger to the mother or infant donor. The gathering of UCB from the placenta is

performed within ten to fifteen minutes after the placental delivery through puncturing one among the umbilical veins with a needle. This can be done under sterile technique and also the UCB is collected into a sterile bag containing an anticoagulant to forestall clotting (**Edwin Francis, Deenajothy, & Immanuel, 2016**).

Umbilical cord blood banking (UCB) is the process of collecting and storing umbilical cord blood, in the immediate period after the birth of a baby. It contains powerful stem cells, including hematopoietic cells, which is beneficial (Armstrong et al., 2018). Cord blood can be collected, and stored either publicly or privately. Public cord blood banks operate in all developed countries, and within most developing countries. By 2014, the international cord blood banking network comprised over 160 public cord blood banks in 36 countries, with over 731,000 umbilical cord blood units stored (**Davies, Walker & Keating 2017 & Peberdy, et al., 2018**). Public cord blood banks collect, transport, process, test and store cord blood units that have been altruistically donated for allogeneic use, at no financial cost to the donating parents. While, Private cord blood banks charge parents a fee for the collection, processing, and storage of their infant's cord blood for exclusive autologous or family use (**Petrini, 2013**).

There are three forms of UCB banks: public, private, and hybrid. Publicly banks, the UCB is stored for free of charge and is obtainable for any recipient who needs an allogeneic transplant. There are currently approximately 44 public banks everywhere the globe and that they are connected to the globe Marrow Donor Association (WMDA) (**Saleh, 2019**). Private Bank, in contrast, charges for UCB collection and storage so as to cover

the upkeep costs. The collected and stored UCB is obtainable for the kid that donated it and for his or her family; although research has shown that the probability that a toddler uses its blood is extremely low, ranging from 1 in 1,000 to 1 in 200,000. Hybrid cord blood banks have recently been funded in several countries to decrease costs for UCB storage, due to the limited funding for public UCB banks. Hybrid banks are a brand new model that mixes allogeneic UCB donation and autologous cell storage (Tufekci, Kara, & Kilic, 2017). In Egypt, UCB bank consists of public and private sectors. Public health coverage is provided through the Ministry of Health, which operates a series of free health care facilities. There are two major parastatal organizations, the Health Insurance Organization (HIO), and the Curative Care Organization (CCO). Health Insurance Organization covers disabled individuals, graduates, employees, and widows. Curative Care Organization works in different governorates, and contracts for care delivery with other organizations. Private insurance plans are also available, as well as a network of private health care services and health facilities.

Awareness toward umbilical cord blood banking is insufficient and still not familiar among pregnant women, especially in Egypt. A study done by (Poomalar & Jayasree, 2016) to assess awareness regarding cord blood banking, they found that, the majority of women are unaware of public cord blood banking. Also, despite a positive attitude of pregnant women towards UCB banking, they are not sufficiently attentive to this service and so seldom proceed to donate UCB. A comprehensive and wide-ranging approach must be implemented to reinforce necessary information about

UCB banking for pregnant women, particularly targeting the younger population and people with lower education (Matijevic & Erjavec, 2016).

Pregnant women need to be aware of the options that exist for their infant's cord blood and have access to the relevant information to inform their choice. Women's knowledge and understanding of cord blood banking and donation have been reported to be low and little are known about their source of information on this topic and the quality of the information provided (Peberdy et al., 2018). A number of studies have been conducted in several countries to learn about peoples' knowledge, understanding, preferences, and attitude toward CB banking. Unfortunately, most results have shown inadequate knowledge in the public, expecting mothers, and even medical staff or health care providers to know about it. Thus, the present study contributes to understanding to assess awareness among pregnant women toward umbilical cord banking and stem cell.

Significance of the Study:

Despite the numerous benefits of the stem cell obtained from the blood of the umbilical cord, it considered medical waste, and also all women prefer to eliminate of placenta after delivery that happens due to a lack of knowledge about its benefits and uses in addition to the negative attitude of pregnant women about cord stem cell collection. (Edwin Francis, et al., 2016). A study was done in Egypt, by Mohammed & EL Sayed (2015) to assess maternity nurses' knowledge and attitude regarding cord blood collection and stem cells does a study. They recommended that utilizing counseling for pregnant women regarding this subject is very important. Thus, pregnant women's knowledge about

umbilical cord blood and stem cell banking needs to be improving.

In Egypt, there are scarce studies focus on knowledge about stem cell and umbilical cord banking. Thus the findings of the current study will contribute to increasing the knowledge to the evidence regarding the importance to enhance public awareness about the benefit of stem cells in the treatment of some diseases, which may raise the number of stem cell donors (Armstrong, et al., 2018). Also, nurses who provide prenatal care should be able to provide counseling to pregnant women about the benefits of stem cells collected from hospitals so, it will help in developing organized guidelines to increase the knowledge base and help in improving the quality of care.

Aims of the study: -

The aim of the study is to assess pregnant women's knowledge and attitude towards umbilical cord banking and stem cell.

Subjects and Methods

Research questions: to fulfill the aim of this study the following research questions were formulated

1. What is the level of knowledge toward umbilical cord banking and stem cell?
2. What is the attitude of women regarding umbilical cord banking and stem cell?
3. Is there a relationship between the level of pregnant women's knowledge and attitude about umbilical cord banking and stem cell?

Research design: -

A descriptive exploratory design was adopted for this study to achieve the study aim. it was used to describe and explore knowledge and attitude among pregnant women toward UCB and relationship with socio-demographic characteristic. It is a type of research design used to describe characteristics of a population or phenomenon that has not been clearly defined (Polit & Beck, 2014).

Setting:

The study was conducted at the obstetrics & gynecology outpatient clinic at Beni-Suef University Hospital in Egypt. Care was provided by obstetricians, as well as professional and diploma nurses who were responsible for providing nursing care.

Subjects:

A convenient sample of 200 pregnant women who attended the antenatal clinic to receive routine antenatal care was recruited according to their scheduled appointment. The included sample were women in the childbearing period – any time of gestation- willing to participate in the study. Women who were unwilling of a woman to participate in the study were excluded.

Sample size

A total of (200) pregnant women were selected according to the following statistical formula $n = Z^2p(1-p) / d^2$, where z = level of confidence according to the standard normal distribution (for a level of confidence of 95%, $z = 1.96$). p = estimated proportion of the population that presents the characteristic (when

unknown we use $p = 0.5$, $d =$ (d is considered 0.05).

Tools for data collection: to collect data pertinent to the study three tools were constructed and used by the researchers after reviewing related literature.

(1) Maternal Structured interviewing questionnaire: it consists of 11 items categorized into two parts. **Part I:** Designed to gather data about the demographic characteristics of the study sample (age, educational level, occupation, residence, and week of gestation) (5 items). **Part II:** Designed to collect data about obstetric history (as data about the current pregnancy, week of gestation, consanguineous marriage, history of abortion, previous anomalous baby, and History of genetic disorder & cancer) (6 items).

(2) Knowledge assessment questionnaire. Designed to gather data about the knowledge of women concerning umbilical cord and stem cell collection and banking. It consisted of 14 questions. The instrument was scored as: correct answer = 2, and wrong answer = 0. The total knowledge score ranged from 0 to 28. Poor knowledge score ranged from 0 – 10, average knowledge score ranged from 11 – 18, and good knowledge score ranged from 19 to 28.

(3) Attitude assessment questionnaire. Designed to collect data about the attitude of pregnant women towards umbilical cord stem cell collection and banking. It was adapted from **Dinc & Sahin (2009)**. It consisted of 10 statements. Scoring system for the attitude of pregnant: The women responded to each of the 10 statements using a three-point by using (Likert scale: (0) disagree, (1) Neutral, (2) agree. Total score of the attitude scale ranged from 0

to 20. < Woman who her score was less than 60 % have a negative attitude and \geq 60 % have a positive attitude.

Validity and Reliability of the tool

The current study tools were developed by the researchers and evaluated the validity of the tool by a jury of five experts in obstetric and maternity nursing. Modifications were carried out according to the panel judgment on the clarity of sentences and appropriateness of the content. Test reliability of the proposed tools was tested by (Cronbach's $\alpha=0.84$), showed a strong significant positive correlation between the items of tools.

Pilot study

A total of 10% of the study sample were included in the pilot study to assess the feasibility and clarity of the tool and determine the needed time to answer the questions. The pilot study revealed that; the average length of time needed to complete the structured interview was approximately 15 minutes with each woman. The sample included in the pilot study was excluded from the study.

Ethical considerations

Official permission was taken from the authoritative personnel in the hospital. The researchers introduced themselves to the women who met the inclusion criteria and they were informed about the aim of this research to obtain their acceptance to share in this research. The aim and nature of the study were explained to each participant and assurance that participation was voluntary and can withdraw at any time without affecting care provided as well as, anonymity, privacy, confidentiality were maintained. As well; official permission was taken from the hospital administrative personnel in the recommended setting to collect the data.

Procedure

Official permission was obtained from the hospital as well as oral informed consent from pregnant women who met the inclusion criteria. The study was carried out through; interviewing, recruitment and assessment.

Interviewing and recruitment

Before collecting the data, the researcher reviewed the recent literature to construct and prepare tools for data collection. Data collection tools were revised by experts in the field of obstetric and maternity medical and nursing. The researcher does modifications depend on the jury. Official permission was obtained from the administrative authority of the Obstetrics and Gynecology Department Hospital affiliated to Beni-Suef University hospital and outpatient manager.

The researcher met pregnant women who accept to participate in the study at the waiting station outside the obstetrics and gynecology outpatient clinic after finishing the antenatal visit. The researcher interviewing the women and explaining the aim of the study. Moreover, the confidentiality of the information was assured. After obtaining approval and oral informed consent to conduct the study, data were collected three days/week, around five to seven women per day for three months. data duration around three to four months (2020).

Assessment

Data collection through interviewing questionnaire with each woman by the researchers individually using the tools for data collection related to socio-demographic as age, level of education, occupation, and residence; and obstetric history (as data about the current pregnancy, week of gestation, consanguineous marriage, history of

abortion, previous anomalous baby, and history of genetic disorder & cancer) were collected and recorded in the sheet. As well as, Knowledge and attitude assessment questionnaire were recorded. Using the face-to-face interview with each woman individually by the researcher for data collection. The interview took about 20- 30 minutes with each pregnant woman.

Statistical analysis: Data collected, tabulated, and statistically analyzed using an IBM personal computer with Statistical Package of Social Science (SPSS) version 22 (SPSS, Inc., Chicago, Illinois, USA). Where the following statistics was applied: Descriptive statistics, in which quantitative data presented in the form of

the mean (\bar{X}), standard deviation (SD), range, and qualitative data presented in the form of numbers and percentages. Analytical statistics include the following significant tests. **Chi-square test (χ^2)** used to study the association between two qualitative variables.

Results:

Table (1): Concerning socio-demographic characteristics; the study sample consisted of 200 pregnant women who participated in the study; ranged in age from 22 years to 42 years, with a mean age of 30.87 ± 4.79 years old. Most of the study sample (53%) was between 20-30 yrs. old. Moreover, more than half of the pregnant women (73%) lived in urban areas. Regarding educational status, 30.5% had graduate university-level education, 26.5% had completed their secondary education, and 23.5% had finished intermediate education, as shown in Table 1. Regarding occupation, (68%) of them was a housewife.

Added to that majority (71%) of the study sample were primipara while

the remaining were multipara (29%). Most of the women (57%) in the study sample were in their third trimester. A minority of the study (1.5 %) sample had a previous baby anomaly as shown in table 2.

Figure (1): In relation to sources of information toward umbilical cord banking and stem cell, pregnant women reported that internet, and social media were the most used sources of information representing 54 %, while health care providers(nurse and midwives) represented 28%. The results infer that more are largely depending on unreliable and valid sources of information risking their health.

Figure (2): shows that total knowledge categories shows that total knowledge categories (42.5%) had a good level, (34%) had an average level, (23%) had poor level of knowledge toward umbilical cord banking and stem cell.

It is obvious from the **figure (3)** that more than half of the study sample (67%) had a negative attitude regarding cord blood banking and stem cell as compared (33%) had a positive attitude.

It is obvious from the **table (3)** that, there was no statistically significant difference between total knowledge level and attitude among women regarding blood banking and stem cell.

To examine the relationship between knowledge, attitude and socio-demographic characteristics among pregnant women. The analysis using chi-square showed that there was statistically significant association with knowledge and age ($\chi = 13.10$, $p = 0.01$), while not statistically significant with knowledge and residence and occupational level ($\chi = 1.70$, $p = 0.43$ & $\chi = 3.18$, $p = 0.20$) respectively. On the other hand, there was a statistically significant difference found concerning attitude and age ($\chi = 26.55$, $p = 0.001$). While, no relation between attitude and residence and occupational level ($p > 0.05$) (table, 4).

To examine the relationship between knowledge, attitude and educational level among pregnant women. The analysis using chi-square showed that there was statistically significant association with knowledge, attitude level and educational level ($\chi = 16.86$, $p = 0.01$ & $\chi = 11.39$, $p = 0.01$) respectively (table, 5).

Table 1. Frequency distribution among studied sample according to their general characteristics (n=200)

Items	No	%
Mothers Age (Years)		
20-30	106	53%
31-40	82	41%
> 40	12	6 %
Age (M ± SD) years	30.87 ± 4.79	
Maternal Educational level		
Read and write	39	19.5%
Intermediate education	47	23.5%
Secondary education	53	26.5%
University level	61	30.5%
Mothers Occupation		
Housewife	136	68%
Working	64	32%
Mothers Residence		
Urban	146	73%
Rural	54	27%

Table (2) Frequency distribution among the studied sample according to their obstetric history.

Characteristics	Number of Participants (N =200)	Percent (%)
Parity		
Primi	142	71%
Multi	58	29%
Week of gestation		
24-37	86	43%
> 37	114	57%
No obstetric history	132	66%
Consanguineous marriage	37	18.5%
History of abortion	11	5.5%
Previous anomalous baby	3	1.5%
History of genetic disorder & cancer	17	8.5%

Figure (1) the source of knowledge regarding UCB & stem cell among study sample.

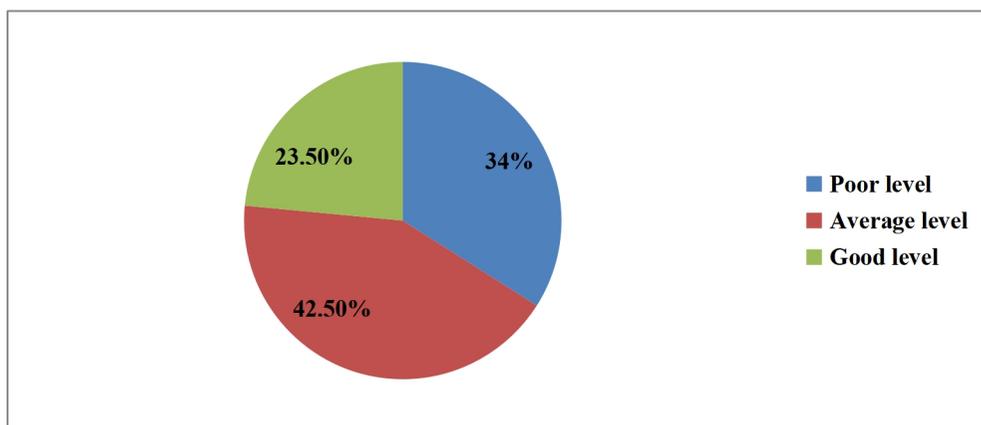
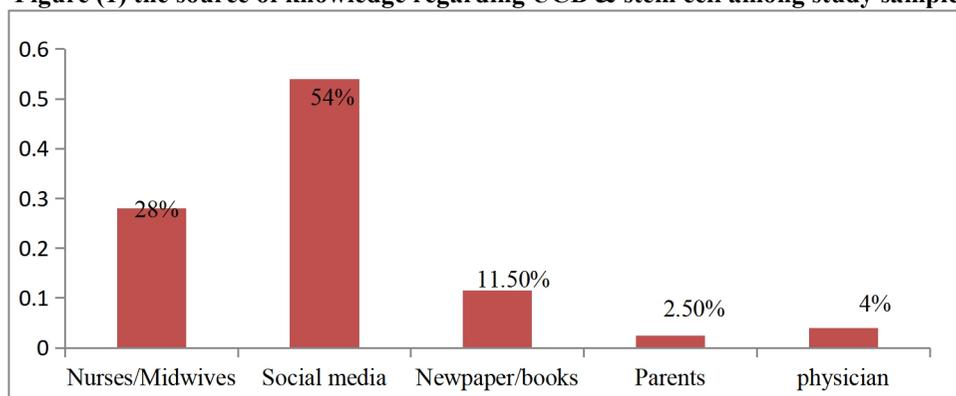


Figure (2) Distribution of the total knowledge level regarding UCB and stem cell.

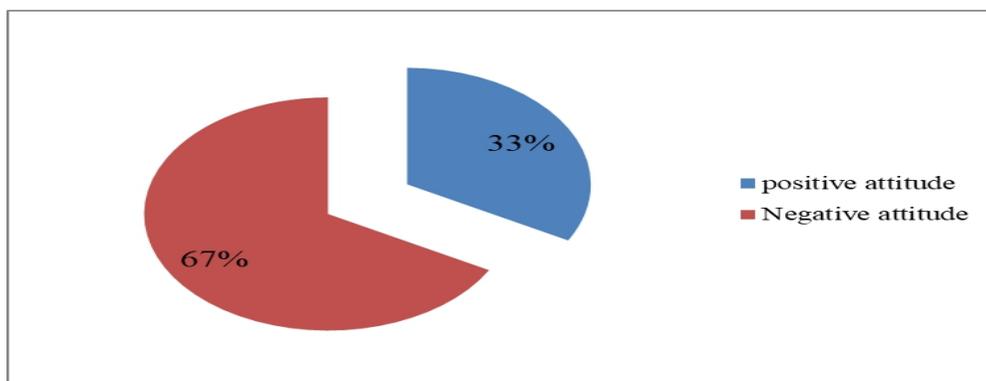


Figure (3) Distribution of the total attitude categories regarding UCB and stem cell.

Table (3) the relationship between pregnant women's knowledge and attitudes about cord blood banking and stem cell.

Total attitude categories	Total knowledge categories			p-value
	Poor	Average	Good	
Positive	27 (40.9%)	23(34.8%)	16(24.2%)	X=2.76 P=0.25
Negative	41(30.6%)	62(46.3%)	31(23.1%)	

Table (4): Relationship between knowledge, and attitude about umbilical cord banking and stem cell and Socio-demographic characteristics among pregnant women (n=200)

Variables	Age			Residence		Occupation	
	20-30 N = 106	31-40 N = 82	>40 N=12	Urban N = 146	Rural N = 54	Housewife N = 136	Working N = 64
Knowledge:							
Poor	36(34%)	25(30.5%)	7(58.3%)	52(35.6%)	16(29.6%)	50(36.8%)	18(28.1%)
Average	38(35.8%)	45(54.9%)	2(16.7%)	58(39.7%)	27(50%)	52(38.2%)	33(51.6%)
Good	32(30.2%)	12(14.6%)	3(25%)	36(24.7%)	11(20.4%)	34(25%)	13(20.3%)
X (p-value)	13.10 (0.01)*			1.70 (0.43)		3.18 (0.20)	
Attitude:							
Negative	73(68.9%)	61(74.4%)	0(0%)	102(69.9%)	32(59.3%)	92(67.6%)	42(65.6%)
Positive	33(31.1%)	21(25.6%)	12(100%)	44(30.1%)	22(40.7%)	44(32.4%)	22(34.4%)
X (p-value)	26.55(0.001)*			2.01(0.15)		0.08 (0.77)	

*Statistically significant p-value ≤ 0.05

Table (5): Relationship between knowledge, and attitude about umbilical cord banking and stem cell and educational level among pregnant women (n=200)

Variables	Educational level			
	Read & write N = 39	Intermediate N = 47	Secondary N = 53	University level N = 61
Knowledge:				
Poor	21(53.8%)	18(38.3%)	12(22.6%)	17(27.9%)
average	11(28.2%)	16(34%)	32(60.4%)	26(42.6%)
good	7(17.9%)	13(27.7%)	9(17%)	18(29.5%)
X (p-value)	16.86 (0.01)*			
Attitude:				
Negative	23(59%)	25(53.2%)	17(32.1%)	50(82%)
Positive	16(41%)	22(46.8%)	36(67.9%)	11(18%)
X (p-value)	11.39(0.01)*			

*Statistically significant p-value ≤ 0.05

Discussion

Blood from the umbilical cord, which is collected immediately after birth, is rich in blood-forming stem cells that are genetically identified to the newborn. It is a source of hematopoietic stem cells used for the treatment of malignant and non-malignant diseases (**Armstrong et al., 2018**). The current study aimed to assess pregnant women's knowledge and attitude toward umbilical cord banking and stem cell. The findings of this study answer the research questions that the level of knowledge and attitude toward UCB and there was a significant difference in the level of knowledge and attitude among women and their socio-demographic characteristics. The following are the two key sections of the discussion of findings obtained from the studied subjects: (I) Demographic characteristics, and obstetric history, and (II) knowledge, attitude, and their socio-demographic characteristics relationships.

Section I: Socio-demographic characteristics, and obstetric history:

A purposeful research sample of 200 pregnant women participated in the

study; their ages ranged from 22 years to 42 years, with a mean age of 30.87 ± 4.79 years old. Moreover, two-third of the pregnant women was lived in urban areas. One-third of the study sample had graduate university-level education, One-quarter of the sample had completed their secondary education, and the remaining had finished intermediate education. Nearly two-thirds of them were housewife. In my opinion, low educational levels among the women in the current study associated with decrease awareness toward UCB. This finding was consistent with many researchers who agreed that the majority of the study sample was not complete their education and live in the urban areas (**Tufekci, Kara, & Kilic, 2017**). Also, the findings of this study are contradicted by the results of **Rashed, & Shehata, (2018)**, the mean age was 26.09 ± 4.56 and almost more of the study sample had complete secondary and university education and live in rural area.

Regarding obstetric history, in the present study two-third of the study sample were primipara while, one third was multipara. Half of the study sample was in their third trimester. This finding consistent with **Jawdat, et al., (2018)**.

Section II: knowledge, attitude, and their socio-demographic characteristics relationships.

There is a rising need for awareness among pregnant women about umbilical cord blood banking and stem cells in our country. Thalassemia's and sickle cell diseases/anemia constitute the most common inherited recessive disorders globally and they are common in our country (Bittles, & Black, 2010). Many other diseases which could be treated by UCB transplantation is on rise. The present study shows that half of the study sample had poor level of knowledge, less than quarter of the study sample had a good level of knowledge toward umbilical cord banking and stem cell. This may be related to majority of the studied sample not complete their education and primipara have not knowledge and experience. Similar to our study results various other studies show pregnant women's poor knowledge on cord blood banking. This finding was supported by a descriptive Saudi study by **Habib et al., (2017)** about "Saudi Women knowledge and Attitude of toward UCB". They reported that half of the sample had poor knowledge score and only 18% had good knowledge score. Moreover; the current finding was also agreed upon by **Rashed, & Shehata, (2018)** who studied "Evaluation of Pregnant Women's Knowledge and Attitude toward Banking of Stem Cells from the Umbilical Cord Blood Before and After Counseling ". They concluded that the overall awareness about the UCB was very poor among the studied sample before counseling. The lack of knowledge about this issue may be because it is a new phenomenon and there were impaired health policies on this issue.

Concerning the source of information related to umbilical cord banking and stem cell, the main source of

information in the current study were social media and followed by nurses and physician. These findings in same line with, a study done by **Tufekci et al., (2017)**. To assess knowledge and attitudes about umbilical cord blood banking. They revealed that the primary source of information for mothers was the media and the internet and the secondary source was healthcare professionals. This may be related to the media and internet now is vital part among women. In contrast, **Poomalar & Jayasree (2016)** stated that doctors, and nurses were the main source to provide information to the public regarding umbilical cord blood storage and the internet constituted only 5%.

Concerning the pregnant women's attitude toward the umbilical cord banking and stem cell. The present study showed that more than half of the study sample had a negative attitude regarding cord blood banking and stem cell as compared around one third of them had a positive attitude. The present study results were in the same line with **Key Value Pair (2018)** who studied the knowledge and attitude of pregnant women about the preservation of umbilical cord blood. **Key Value Pair, (2018)** concluded that majority of the sample had a negative attitude toward the stem cell and blood banking. Besides, **Jawdat et al. (2018)** in their study about public awareness of cord blood banking in Saudi Arabia found that around two-thirds of subjects had inadequate knowledge and negative attitude.

Regarding the relationship between knowledge, attitude and their socio-demographic characteristics. The analysis using chi-square showed that there was statistically significant association with knowledge and age. While not statistically significant with knowledge and residence and occupation.

On the other hand, there was statistically significant difference found in relation to attitude and age. While, no relation between attitude and residence and occupation ($p > 0.05$). Add more, the analysis using chi-square showed that there was statistically significant association with knowledge, attitude and educational level. This findings with same line with **Matijević, & Erjavec, (2016)**.

Conclusion

In conclusion, despite a negative attitude of pregnant women towards UCB banking and stem cell, nearly half of the study sample had average level of information about this topic and therefore seldom proceed to donate UCB.

Recommendations

Based on the finding of the current study, women's knowledge and attitude of umbilical cord blood banking and stem cell should be raised during their antenatal visits.

Future Recommendations

1) The obstetricians, gynecologists and others health care professionals should make it a priority to increase awareness of umbilical cord blood banking and donation to develop and expand the status of UCB banking in Egypt.

2) In-service training programs about new trends in nursing care and practices must be developed to enhance nurses' knowledge so become able to properly counsel pregnant women.

3) Health care providers, especially midwives and nurses, should have a sufficient level of education to explain

and provide necessary information to pregnant women.

4) Approaching mass media for spreading awareness of UCB's advantages and benefits of its storage in UCB banks is recommended.

Conflict of interest:

There is no conflict of interest and no fund from any institution.

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