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Evaluation of knowledge and Attitude of Pregnant Saudi Women toward Cord Blood Donation

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Abstract:
Background: Cord blood contains all the normal elements of blood - red blood cells, white blood cells, platelets and plasma. But it is also rich in hematopoietic (blood-forming) stem cells, similar to those found in bone marrow. This is why cord blood can be used for transplantation as an alternative to bone marrow. **Aim:** the aim of this study was to assess and evaluate the knowledge and the attitude of the Saudi married and pregnant women from 18 to 45 years toward umbilical cord blood donation. **Method:** A quantitative descriptive cross sectional research design was used for the current study. The setting was obstetrics and gynecology clinic at King Abdul-Aziz Medical City. The sample included 300 subjects. Self-administered structured interviewing questionnaire was used as tool for data collection. **Results:** About half of the women (43.1%) had poor total knowledge score. Only 18% had good total knowledge score. However the women tend to have good attitude (49.6%) regarding cord blood donation. There was a strong statistically significant positive relationship between total knowledge score and the total attitude score ($p = 0.000$). **Conclusion:** Although the majority of the women had either fair or poor knowledge but the good percentage of women had good attitude toward cord blood donation. This finding could serve as a base for antenatal educational program for the pregnant women to raise their awareness about cord blood donation

Introduction:

Cord blood is used for past 25 years as an alternative to bone marrow in the treatment of blood, metabolic disorders and immune system because of its rich source of hematopoietic stem cells. Transplants of Cord blood stem cell are now an approved therapy for more than 80 medical disorders because of its rich source of mesenchymal stem cells which show great potential for use in regenerative medicine. Many clinical trials are underway investigating the benefit of hematopoietic and mesenchymal stem cells for neurological and autoimmune disorders such as Type 1 Diabetes, Autism, and Cerebral Palsy (Clinical Trials Register, 2014).

In all multi cellular organisms stem cells are found, and are characterized by the ability to renew through mitotic cell division and differentiate into a diverse range of specialized cell types. The two broad types of mammalian stem cells are: embryonic stem cells that are isolated from the inner cell mass of blastocysts, and adult stem cells that are found in adult tissues (American College of Obstetricians and Gynecologists, 2011).

Stem cells from the remaining segment of the umbilical cord and placenta are known as ‘umbilical cord blood (UCB) stem cells’. This blood which is of no use to the mother or the baby and has been treated as a medical waste for centuries is a rich source of stem cells. UCB stem cells are unique and have many promising uses for the future. As these cells are naïve, on allogeneic transplantation, they produce an attenuated donor-derived immune response and thus have a lower incidence of graft-versus-host reaction when compared to other sources of stem cells (bone marrow or peripheral cells). Unlike other sources, these can also be transplanted even without an identical HLA match. The collection procedure is easy and without any risk to the donor (mother or baby) (Pandey D, 2016).

Umbilical cord blood banking is the process of collecting and storing umbilical cord blood, in the immediate period after the birth of a baby (Cooper CA, 2013). Umbilical cord tissue banking is the process of collecting and storing a small segment of the umbilical cord after the delivery of the placenta (Fannin M, 2011).

UCB can be banked in two ways such as Private UCB banks–where the UCB of a newborn is stored at certain cost and can be used only by the child or his family if need arises; It also can be stored in Public UCB banks–these are similar to blood-banks. In these UCB banks any pregnant woman can enroll to donate UCB at the time of child birth free of cost, and anyone in need can utilize it at a certain cost (Pandey D, 2016).

Cord blood banking is a growing phenomenon and number of cord blood units being collected and stored are increasing. The first public cord blood bank opened in New York in 1993 (Stanevsky A, 2009). Parents are aware of private blood banks through advertisements and media coverage, however parents appeared to be more directed towards private vs public storage of their infant's cord blood. From this sources, they are often misinformed about the unrealistic future usage, for commercial banks list many conditions which can be treated in the future by as yet undeveloped stem cell therapies for regenerative medicine (Haw J 2015).

Studies have been conducted internationally exploring pregnant women's and/or expectant parents' knowledge and perceptions of cord blood banking. Various studies have revealed that most of the respondents would like to obtain information regarding cord blood banking and donation from their antenatal care provider (Jordens CF, 2014). Antenatal care providers have an important role in providing accurate, unbiased, evidence-based information about cord blood banking options to assist expectant parents with their decision (Herlihy MM, 2013).

Studies done in Europe and Canada had revealed that pregnant women have very limited knowledge about UCB and its banking (Fox NS, 2007). A study done by (Conrad V Fernandez, 2003) reveals more than half of the women (307/438 or 70% [95% confidence interval, CI, 66% to 74%]) stated poor or very poor knowledge about cord blood banking. Majority of the respondents (299/441 or 68% [95% CI 63% to 72%]) thought that physicians should talk to pregnant women about the collection of cord blood, and they wanted to obtain information about this subject from health care professionals (290/441 or 66% [95% CI 61% to 70%]) or prenatal classes (308/441 or 70% [95% CI 65% to 74%]).

The cord blood is a rich source of stem cells, making it a valuable tissue resource in the clinical field of stem cell therapy and transplantation. In spite of many benefits of the stem cells obtained from umbilical cord blood, the umbilical cord was considered medical waste and disposed of following delivery along with the placenta due to the lack of knowledge about its benefits and uses. Unfortunately there was no study done in Saudi Arabia of cord blood, therefore it was highly significant to study the knowledge and practice of Saudi married and pregnant women toward cord blood. (Bordet, 2010).

It is therefore timely that research into the knowledge and the attitude of pregnant women toward cord blood donation to identify gaps which exist in knowledge that may influence their attitudes and practices towards informing expectant parents about their options. Therefore the aim of the present study was to evaluate the knowledge and the attitude of pregnant Saudi women toward cord blood donation.

Aim

The aim of this study was to evaluate the knowledge and the attitude of the Saudi pregnant women from 18 to 45 years toward umbilical cord blood Donation.

Research question

1-What is the level of knowledge of the Saudi pregnant women regarding cord blood donation?
2-What is the attitude of the Saudi pregnant women toward cord blood donation?
3- What is the relationship between knowledge and attitude of pregnant women about cord blood donation?

Research Methodology

A quantitative descriptive cross sectional design approach was used to conduct this research. With the aim to evaluate the knowledge and the attitude of the Saudi pregnant women toward umbilical cord blood storage, and assess the relationship between their knowledge and their attitude. The research study was conducted in obstetrics and gynecology clinic at King Abdul-Aziz Medical City (KAMC). It is one of the largest tertiary hospitals in Saudi Arabia and the Middle East. It has a total of 40 wards and 1200 beds. (KAMC) in Riyadh. KAMC is providing services for a rapidly growing patient population in all of its catchment areas.
Data was collected from obstetrics and gynecology outpatient clinic. It serviced about 2,000 to 4,000 patient per month and it has 16 examination rooms, screening room, assessment room, and outpatient ultrasound department. Women was approached while they were in the waiting area coming for their antenatal visits. A convenience sample was recruited for the current Study. The inclusion criteria were Saudi pregnant female

during their last trimester, Singleton pregnancyfrom Riyadh city, can read and write Arabic. The exclusion criteria was women who had high risk condition such as gestational diabetes, hypertension or infection

The sample size was determined using the online sample size calculator with the confidence level of 95% and confidence interval of 6 and population size of 500000 to be 267 subjects. The sample size was increased to 300 subjects to ensure representativeness of the sample. The research study was considered with minimal harm due to the research design used in this study. Consent was taken from each participant prior to conducting the study. Participants were assured that the confidentiality will be maintained. And they were informed that they have the right to withdraw from the study at any time and that will not affect the quality of care or interfere with the medical interventions.

Self-administered structured interviewing questionnaire was used as tool for data collection. The questionnaire was translated into Arabic Language. The questionnaire consisted of three sections as follows: Part one consisted of socio-demographic data and obstetric history. The socio- demographic data included age, education, occupation, marital status, etc. The obstetric history included number of pregnancies, deliveries, living children, and abortion. Part two was designed to assess pregnant women's knowledge about cord blood collection. It consisted of 15 closed ended questions. The knowledge part was scored as: correct answer = 2, do not know = 1 and wrong answer = 0. The total knowledge score for each subject was calculated. The score ranged between 0 to 30. Poor knowledge score ranged between 0 – 10, average knowledge score ranged between 11 – 20, and good knowledge score ranged between 21 to 30. Part three was designed to assess women's attitude toward cord blood donation. It was a 5 Points Likert Scale ranged between strongly agree = 5 to strongly disagree = 1 and it included 7 statement such as it is necessary for cord blood banking for storage of stem cells? When cord blood is taken, is the baby not harmed at all? The total score ranged between 7 and 35. Poor attitude score ranged between 7 to 16, fair attitude score ranged between 17 26, and good attitude sore ranged between 27 to 35.

Face validity was performed for the developed parts using back translation from English to Arabic by a bilingual translator. The content validity of the instrument was assessed by an expert in the field. Test retest method was used to determine the reliability of the tool, the reliability was 0.79. A pilot study was done on 10 subjects who were excluded from the study. A pilot study was conducted to test the feasibility and applicability of the tools, and to identify the most suitable time to collect data. The pilot study was carried out on five subjects. The result of the pilot study was used to help in refining the interview questionnaire form.

Data was coded for entry and analysis using SPSS statistical software package version 22. Data was presented using descriptive statistics in the form of frequencies and percentages. Interval and ratio variables were presented in the form of means and standard deviations. Correlation between knowledge and attitude was assessed using person's correlation test. The total score for the two scales in section 2 and 3 were calculated. The significance level was chosen as ($p<0.05$).

Results

The current study was done to assess and evaluate the knowledge and the attitude of the Saudi pregnant women from 18 to 45 years toward umbilical cord blood donation. The sample included 300 pregnant Saudi women. Data was collected from obstetrics and gynecology clinic at King Abdul-Aziz Medical City.

Table 1: Frequency Distribution of the Socio-demographic Characteristics of the Sample: (N = 300)

Variables	Number	Percent
Age		
18-25	26	8.7
26 – 35	114	38.0
36-45	160	53.4
Mean	35.59	
SD	6.71	
Education		
Illiterate	2	7
Elementary -	27	9.0
Middle -	25	8.3
Secondary	83	27.7
University	163	54.3
Occupation		
housewife	130	43.3
Employee	170	56.7
income		
less than 5000-	76	25.3
Between 5000-1000-	118	39.3
Mmore than 1000-	106	35.3
Number of family members		
2-5	144	48
6 – 8	127	42.4
9-11	29	9.7

Table 1 showed Frequency distribution of socio-demographic characteristics of the sample:

The mean age was 35.59 ± 6.71 about half of the sample (51.7%) had their age ranged between 36 and 45 years old. Regarding the education half of the sample (54.3 %) had completed their university education. While only 7% of the sample where illiterate. Regarding the occupation more than half of the sample (56.7%) where employee while 43.3% of the sample where house wives. About 40% of the sample had family income ranged between 5000 to 10000 Saudi Riyal, while only one fourth of the sample had income less than 5000 Saudi Riyal. About half of the sample (48%) had 2-5 family members.

Table 2: Frequency Distribution of the Obstetrical History of the Women in the Sample (N= 300)

Variable	Number	Percentage
Number of pregnancies		
0-3	139	46.3
4-7	100	33.3
8 and up	61	20.3
Number of deliveries		
0-3	136	45.3
4-7	123	41.0
8 and up	41	13.7
Number of living children		
0-3	132	44.0
4-7	130	43.3
8 and up	38	12.7
Number of abortion		
0-3	293	97
4-7	5	1.7
8 and up	2	0.7

Table 2 showed frequency distribution of the obstetrical history of the women in the sample. Regarding the numbers of pregnancies, almost half of the women in the samples (46.3) had 4-7 children, while only 20.3% of

the sample had 8 or more children.
Regarding number of deliveries, 45.3% of women had given birth 4-7 times whilst 13.7% of them had delivered 8 and up times. For number of living children, 44% of women have 4-7 Living children, while only 12.7% of them have 8 and up living children. Regarding number of abortions, majority of the women in the sample (97%) had 0-3 of abortions however 0.7% of them had 8 up times of abortions.

Table 3: Frequency Distribution of the knowledge about Cord blood Donation of the Women in the Sample (N = 300)

Knowledge	Correct		Wrong		Do not know	
	#	%	#	%	#	%
Number of arteries and vains in the umbilical cord	33	11	162	54	105	35
Function of the umbilical cord	17	5.7	144	48	139	46.3
Proper time of clamping umbilical cord	54	18	134	44.7	112	37.3
Definition of cord blood	21	7	142	47.3	137	45.7
Benefits of cord blood collection	37	12.3	155	51.7	108	36
Women suitable for cord blood donation	19	6.3	190	63.3	81	27
Women not suitable for cord blood collection	13	4.3	187	62.3	100	33.3
Places for cord blood storage	62	20.7	133	44.3	105	35
Duration for cord blood storage	14	4.7	100	33.3	186	62
Responsible persons for collecting cord blood	71	23.7	142	47.3	34	11.3
Methods of umbilical cord blood collection	28	9.3	124	41.3	128	42.7
Definition of stem cells	53	17.7	111	37	136	45.3
Sites of obtaining stem cells	23	7.6	134	44.7	153	51
Importance of obtaining stem cells from umbilical cord	26	8.6	147	49	125	41.7
Uses of stem cells	25	8.3	150	50	125	41.7

Table 3 showed the frequency distribution of the knowledge about cord blood of the women in the sample. Regarding the number of arteries and vain in the umbilical cord, only 11% of the sample answered correctly, while 54% answer was wrong. Regarding the function of the umbilical cord 5.7% of the sample answered correctly while 8% answered wrong. Regarding the proper time of clamping umbilical cord 18% of the sample answered correctly while 44.7% of the sample answered wrong. Regarding the definition of cord blood 7% of the sample there answered correctly while 47.3% of the sample answered wrong. Regarding the benefits of cord blood collection 12.3% of the sample answered correctly while 51.7% there answered wrong.
Regarding women suitable for cord blood collection 63% answered correctly while 63.3% of the sample answered wrong. Regarding women not suitable for cord blood collection 4.3% answered correctly while 62.8% of the sample answered wrong. Regarding places for cord blood storage 20.7% answered correctly while 44.3% answered wrong. Regarding length of time for cord blood storage 4.7% answered correctly while 33.3% of the sample answered wrong. Regarding responsible persons for collecting cord blood 23.7% answered correctly, and 47.3% answered wrong. Regarding methods of umbilical cord blood collection 9.3% answered correctly while 41.3% answered wrong. Regarding definition of stem cells 17.7% answered correctly while 37% answered wrong. Regarding sites of obtaining stem cells (7.6%) answered correctly while 44.7% answered wrong. Regarding importance of obtaining stem cells from umbilical cord (8.6%) answered correctly while 49% answered wrong. Regarding uses of stem cells 8.3% answered correctly while 50% answered wrong.

Table 4: Frequency Distribution of the Attitude of the Women toward umbilical cord blood Donation (N= 300)

Attitude	Strongly Not agreed		Not agreed		Neutral		Agreed		Strongly Agreed	
	N	%	N	%	N	%	N	%	N	%
Using my baby's own cord blood is more reliable than using other people's cord blood or bone marrow.	22	7.3	28	9.3	77	25.7	48	16.0	125	41.7
I am concerned that my baby's cord blood would be used for different purposes.	21	7.0	45	15	85	28.3	76	25.3	73	24.3
Umbilical cord blood should only be used for baby and his own family	13	4.3	68	22.7	97	32.3	64	21.3	58	9.3
I Believe that everyone can benefit from collected cord blood and stem cells	46	15.3	93	31.0	71	23.7	46	15.3	44	14.7
The collection of cord blood affect the care of mother or her newborn	14	4.7	46	15.3	94	31.3	66	22.0	80	26.7
I Think it is necessary to have baby's cord blood stored.	15	5.0	66	22.0	86	28.7	57	19.0	76	25.3
It is necessary to cord blood banking for storage of stem cells	22	7.3	56	18.7	73	24.3	59	19.7	90	30.0

Table 4 showed that about 41.7 % of the subjects strongly agreed that using baby's own cord blood is more reliable than using other people's cord blood or bone marrow, while 7.3 % strongly disagree. Regarding using the cord blood for the baby and his family only 28.3 % have neutral attitude. While 7.00 % strongly disagreed. Number of subjects who think neutrally are 23.7% that everyone can use and get benefit from the collecting of the cord blood and steam cells. While 15.3% of sample strongly disagreed. Regarding collecting cord blood will affect the mothers or their care for their newborn baby 15.3 % of the subjects not agreed. While 26.7% strongly agreed. Number of subject think neutral are 31.3% that it is important to collect cord blood for the newborn baby. While 4.7% strongly not agreed. Number of subjects who think neutral are 28.7% that it is necessary to collect cord blood for steam cells. While 5.0% only strongly disagreed. Regarding it is necessary to cord blood banking for storage of stem cells only 7.3% strongly not agreed where as 90% of the sample strongly agreed.

Figure 1: Frequency Distribution of Total Knowledge Score of the Women in the Sample (N= 300)

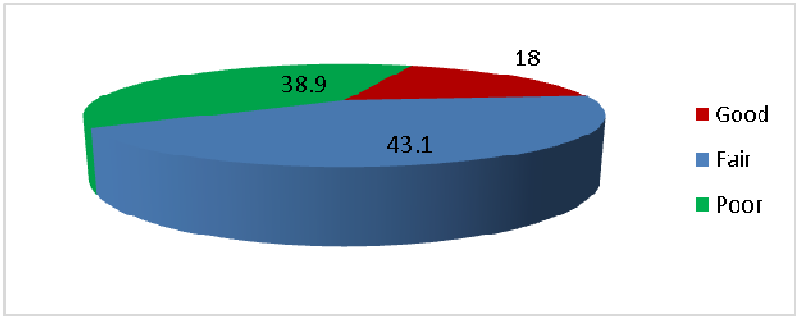


Figure 1 showed the frequency distribution of the total knowledge of the sample. Only 18% of the sample had good knowledge score. About one third of the sample had fair (38.9%) total knowledge score While 43.1% of the sample had poor total knowledge score.

Figure 2: Frequency Distribution of the Total Attitude Score of Women in the Sample (N= 300)

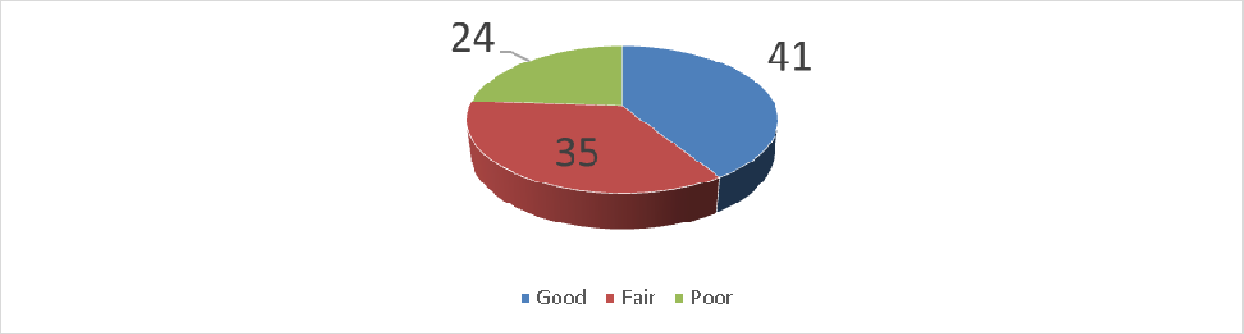
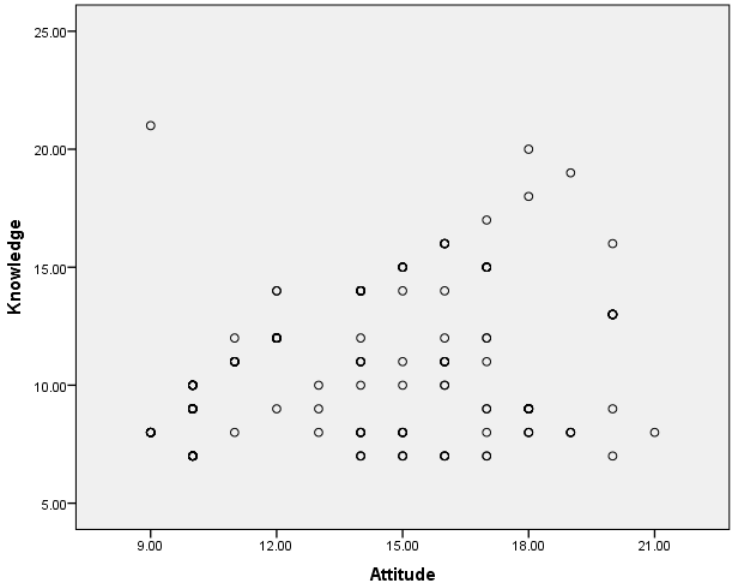


Figure 2 showed the frequency distribution of the total attitude score of the women in the sample. Forty one percent of the sample had good attitude toward cord blood donation, while about one fourth of the sample (24%) had bad attitude. toward cord blood donation

Figure 3: Relationship between the Total Knowledge Score and the Total Attitude Score of the Sample



r = 0,320 **p = 0.000**

Figure 3 showed the relationship between the total knowledge score and the total Attitude Score of the Sample of 300 pregnant women. There was a strong statistically significant positive relationship between total knowledge score and the total attitude score of the Sample (p = 0.000)

Discussion

This study was carried out to evaluate the knowledge and the attitude of the Saudi pregnant women years toward umbilical cord blood donation. The study recruited a convenience sample. The research setting was the obstetrics and gynecology clinic at King Abdul-Aziz Medical City.

Quantitative descriptive cross sectional research design approach was used to accomplish this research. Self-administered structured interviewing questionnaires was used as tool for data collection. With regards to characteristic of the studied sample, it was found that more than half of the sample had their age ranged between 36- 45 years with a mean age of 35.59 ± 6.71 years.

In the present study the mean age of women who completed the questionnaire was 35.59 ± 6.71years. Comparing to other study Christopher F (2014), the mean age of pregnant women who completed the

questionnaire was 32 years. Regarding the educational level of the women in the current study, more than half of the sample completed their university education. These finding also was comparable with the findings by Christopher F (2014), study (51.7%) of the women were university-educated.

In the present study only 7 % of the women knew the definition of cord blood, only 17% knew the definition of stem cells, only 8.6% knew the Importance of obtaining stem cells from umbilical cord and 8.3 % of the sample knew the uses of stem cells. These findings were found to be very low in comparison with a study done by Conrad V. Fernandez (2003) that showed (38.9%) did not know the definition of stem cell, and with the least percentage of 18% answering correctly on 'definition of cord blood, definition of stem cells, Importance of obtaining stem cells from umbilical cord and uses'.

Present study also showed poor knowledge (8.3%) of women on 'uses of stem cells' which was in consistent with a study done by Dinç H, Sahin NH (2009) to determine pregnant women's knowledge and attitudes towards stem cells and cord blood banking in Istanbul, Turkey revealed majority of the participants had a lack of knowledge about stem cells and cord blood banking and needs more information and before becoming pregnant.

This Study also showed poor knowledge (8.6%) of women on 'importance of obtaining stem cells from umbilical cord' which was in consistent with a study done by Conrad V. Fernandez (2003) reveals more than half of the women 70% reported poor or very poor knowledge about cord blood banking and on the value and advantages of cord blood for transplantation.

This study shows only 18% of the sample had good knowledge score which is in consistent with the study done by Dinc H (2009) which reveals majority of the participants had lack of knowledge about stem cells and cord blood banking and wanted more information.

Current study reveals 25.3% strongly agree it is necessary for storage of stem cell banking which is also agreed in study done by Gregory Katz (2011) which states a total of 89% of respondents would opt to store CBUs. Among them, 76% would choose to donate CBUs to a public bank to benefit any patient in need of a cord blood transplant.

Present study also reveals 41% of the sample had good attitude toward cord blood donation. This finding was lower than the results of the study done by Enrico Danzer (2003) which showed vast majority (96.1%) stated that they would donate umbilical cord bold and all respondents were certain that their decision to have donated umbilical cord blood was ethical. In a study by Karagiorgou LZ, et al., (2014) it was found that six percent of the respondents who had children and were in favor of umbilical cord blood transplantation, had stored/donated. Current study also reveals a strong statistically significant positive relationship between total knowledge score and the total attitude score of the sample with ($p=0.000$). This showed that women with good knowledge score had higher attitude score

The majority of the women in the current study had inadequate knowledge about cord blood donation and wanted to be informed. Women had more had positive attitudes toward cord blood that belonged to their infants
The current study can be replicated on a large sample and different cities (National base) in the kingdom, as it could serve as a base for antenatal educational program for the pregnant women to raise their awareness about cord blood donation. Also an information booklet on 'cord blood banking' can be developed, evaluated and handed to pregnant women during their antenatal visits.

Some limitation might exist in the current study. Reporting bias as almost all the surveys were self-reported by adults who might wanted to give socially accepted responses. This study was limited to Saudi female population aged between 18 to 45 years from Riyadh city and who can read and write Arabic.

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Conflict of interest
Researchers declare no conflict of interest with any organization regarding the materials discussed in this manuscript.

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