

Knowledge, Attitude, and Effect on Future Practice Among Pregnant Women About Cord Blood Banking: A UAE Population-Based Survey

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Abstract

Umbilical cord blood is a rich source of powerful stem cells, which comes from the baby's umbilical cord and can be collected immediately after birth. We surveyed the knowledge, attitude & decision of pregnant women regarding umbilical cord blood banking in the United Arab of Emirates (UAE). The purpose of the survey is to gauge and evaluate their level of knowledge and general attitudes about cord blood banking and associated therapies for stem cells and their effect on their practice. The secondary purpose was to better understand the impact of the knowledge and attitudes after an educational intervention performed by a trained Medical consultant whereby pregnant women were informed about cord blood banking.

Keywords: cord blood banking, stem cells, UAE

Methods

A survey was constructed of 6 questions to record the answers of pregnant women's attitude toward cord blood banking. These results will be important to track the success of the cord blood banking education program. The cross sectional survey questions were posed from 01 December 2017 until 31st March 2018 via a questionnaire given to pregnant woman during routine visits at partner hospitals in the UAE. The surveys were offered to 800 women, there were a total of 725 women that filled their details in the informed consent. In addition, the pregnant women that had answered the questionnaire were then given an overview of cord blood banking by a trained medical consultant immediately after the questionnaire was given. The pregnant women were then asked to complete the questionnaire in order to gauge the impact of the intervention.

Results

There were a total of 725 pregnant women that responded during the survey period. 66% of pregnant women had very basic knowledge regarding cord blood banking. 77% of pregnant women did not have any knowledge regarding the diseases or conditions treated by cord blood. Prior the education given only 16% of women considered banking their baby's cord blood. After an education intervention via brochures, and short 10-15 minutes overview by a medical consultant was provided, a significantly high number of the women 88% felt that they had sufficient knowledge regarding cord blood banking and the number of pregnant women who had changed their decision after the education was provided jumped from 16% to 91%.

Conclusion

Educating parents by providing direct information to pregnant women about cord blood banking can have a direct impact on the decision of pregnant women towards cord blood banking. Information should be transparent and accurate. An intervention to pregnant women regarding their education must be provided to mother to have sufficient information in order to make an accurate decision. Education to pregnant women should be offered during the pregnancy period. 91% of pregnant women wanted to be educated regarding cord blood banking. Hence, the education provided has played a significant role in determining the attitude and the decision of the women towards the cord blood banking.

Introduction

Background on Cord Blood Banking

Current research indicates that up to one in three people might benefit from regenerative medicine through the usage of stem cells. (1) Umbilical cord blood is a rich source of hematopoietic stem cells, and have been successfully used for children and adults in life threatening diseases requiring a transplant of blood forming cells.(2) Hematopoietic stem cells are capable of reconstituting hematopoiesis after myeloablative or non-myeloablative. (3) Cord-blood-derived stem cells are primarily used to treat different types of hematological disorders in children. Many reports indicate that the future uses of stem cells are very promising and are expected to be used to treat autism, cerebral palsy, spinal cord injury, Parkinson's disease, heart disease and stroke. The potential uses of stem cells are far from being fully explored and are very promising.

Cord blood collection is a fairly simple, painless and fast procedure that is performed during the delivery

process. The cord blood samples can be collected during Vaginal or Caesarian delivery.

There are two method of collection. The method of collection is either In-utero, or ex-utero collection.

- In-Utero collection method: Collection of cord blood when the placenta is still attached with the mother's uterus.
- Ex-Utero collection method: Collection of cord blood from the cord and placenta after expulsion from the uterus.

Cord blood collection is initiated by Double-clamping and then cutting the umbilical cord. The physician or nurse then snaps down the plastic needle guard around the collection tubing. After delivery of the baby(s), the umbilical cord is disinfected with disinfectant wipe at the needle insertion (collection) site needs to be completed.

The cord blood units that have been processed, tested and stored are ready to be used. The process allows recipients to have immediate access if there is a need for an urgent transplant. It is estimated that more than 35,000 umbilical cord blood (UCB) transplants have been carried out worldwide (5)

Moreover, compared to peripheral blood and bone marrow stem cells, the rejection or graft-versus-host disease with transplants using cord blood stem cells is significantly lower. (4,5)

The massive gap between the potent drugs and fatal malignancies has inspired the scientific research in the field of cord blood banking as an alternative treatment strategy (6). The FDA has given clearance to utilize "cord blood" cell treatment in around 80 diseases (7). Both Hematopoietic stem cells (HSC) and hematopoietic progenitor cells (HPC) form the matter of the cord blood; they are also present in the bone marrow and peripheral blood. HPC, also called the stem cells are proficient at forming red blood cells, white blood cells and platelets. The retrieved cord blood is utilized for transplantation to reinstate hematopoiesis. The procedure offers effective results in patients suffering from malignancies, bone marrow (BM) failure disorders and inherited metabolic and immunological disorders. The steady research confirms the ability of the umbilical cord blood (UCB) cells to accelerate the anticancer activity (3), thus proving it to be an ideal option for immunotherapy. The stem cells show a great potential in the treatment of certain heart and liver diseases. Research is going in the area of utilizing stem cells in the treatment of debilitating diseases like diabetes; cardiovascular and neuro-generative show bright prospects (4).

There are various benefits of selecting umbilical cord blood over bone marrow or peripheral blood for stem cells. The retrieval from the umbilical cord serves an ideal choice as it utilization from waste, unlike the extraction from adult bone marrow. Retrieval of the stem cell from the bone marrow involves an invasive procedure, whereas retrieving stem cells from the umbilical cord is painless for the mother and causes no adverse effects to the baby. Cord blood bears negligible risk of harboring vital viral infections (2). Extracted cord blood can be preserved for many decades under optimum conditions and can be easily retrieved in the treatment of various types of immune- and blood-related disorders and genetic diseases.

Ethics approval for this study were agreed to by Dubai Healthcare City.

Education of Cord Blood Banking

The United Arab Emirates (UAE) is a fast growing country made up of multinational population with different ethical backgrounds, attitudes, and beliefs.

The UAE population in 2017 was 9.4 million. The population of the expatriates in the UAE is 88.5%, with the UAE locals making up only 11.5%. Our initial target group of UAE respondents was 400 pregnant women with the expectation that many of the respondents would be expatriates. However, we focused on city/states within the UAE (Alain, Sharjah and Abu Dhabi) where there is higher concentration of the local residents population to reach our target [20].

There are several opportunities for parents to be informed about the the benefits of Cord Blood Banking. The best opportunity is during prenatal examinations by the examining Obstetricians to create awareness and explain the benefits and utility of cord blood banking. Also, the midwives and nurses can be trained to provide information and in order to have basic knowledge during pregnancy consultations.

The prime goal of the study program is to measure the gap between the pregnant women in UAE and their awareness regarding umbilical cord blood banking. A zealous attempt is made to spread crucial information regarding the efficacy of umbilical cord banking and its advantages.

Previously, umbilical cord and the placenta were considered biological waste and were discarded after birth. Cord blood is the blood in the baby's umbilical. It contains the stem cells, which are known for growing blood vessels, tissues and organs. The cord cells preservation has gain popularity in past few years as research has shown that, the stem cells are capable of growing many life critical organs which can be used to treat various serious illnesses like cancer or organ failures [4].

Cord blood baking involves collecting the left-over blood in the new born baby's umbilical cord and placenta and storing it for future medical use. "Clinical trials are underway for neurological disorders, diabetes, auto-immune disorders and for some cardiovascular problems. So far worldwide more than 35,000 cord blood transplantations were done successfully." [1]. In spite of the many potential benefits stem cells were considered

not more than medical waste in United Arab of Emirates[3]. There is little knowledge present in the common people. Also, there are very few researches available in this field which aim to study in the United Arab of Emirates.

Hence, this work aims to find the “Knowledge, attitude and future practice among pregnant women in the UAE about cord blood banking”. The study also tries to find out the effectiveness of the education provided. Additionally, it also tries to find that if imparting knowledge helps pregnant women in deciding and opting for the cord blood banking.

Method

Our target number of women that was needed for this study was 800 women. We were able to achieve 90% responses from our target. A total of 725 responses from different age women groups and different parts of the UAE participated in this study. A perfect blend of first time pregnant women and multiple times pregnant women has been included in the sample for this study. The survey was conducted in private and public hospitals. The survey questions were posed from 01 December 2017 until 31st March 2018

The study was performed to monitor the knowledge, attitude and future practice of pregnant UAE women ages 18-50 years in terms of cord blood banking, and treatment options and to study the impact of educational intervention of these pregnant woman. The data was collected in a data collection sheet form by asking women in the waiting area in UAE hospitals by Medical Advisors that are trained and knowledgeable about cord blood banking. The answers to the questions were all completed at the premises. The main demographic information of the pregnant women is shown in Table 1. The age of the majority of people who responded to the questionnaires were between the ages 18-29 (21%). The number of people who were UAE local were 74%, and the other Arabs (includes KSA, Oman, Egypt, Moroccans, Yemen, Syrians, Palestinian, and Jordanian’s) .The majority of respondents were giving birth in private hospitals (63%). 43% of the respondents were in their 3rd trimester. Most of the pregnant women were first time moms or had one child (29% and 27% of respondents respectively). Table 1.

| Age | 18-29 | 30-35 | 36-45 | Total | | |
|--------------------|---------------|---------------|---------------|-------|----|-------|
| N | 138 | 237 | 281 | 656 | | |
| % | 21% | 34% | 12% | | | |
| Weeks of Pregnancy | 1st Trimester | 2nd Trimester | 3rd Trimester | Total | | |
| N | 138 | 237 | 281 | 656 | | |
| % | 21% | 36% | 43% | | | |
| Nationality | UAE | Other Arabs | Total | Total | | |
| N | 481 | 166 | 647 | 656 | | |
| % | 74% | 36% | | | | |
| Delivery Hospital | Private | Public | Total | | | |
| N | 266 | 158 | 424 | | | |
| % | 63% | 37% | | | | |
| Number of children | 0 | 1 | 2 | 3 | 4+ | Total |
| N | 184 | 172 | 125 | 100 | 52 | 633 |
| % | 29% | 27% | 19% | 15% | 7% | |
| Delivery Hospital | Private | Public | Total | | | |
| N | 266 | 158 | 424 | | | |
| % | 63% | 37% | | | | |

Table 1: Demographic profile of Survey Respondents

Initially the below set of first 4 questions were given to pregnant women and the answers were recorded before the education intervention. Those who opt for the education program were given the proper education and then the question 5 and 6 were given to them to answer. The education session took 15-20 minutes, it was given by Medical advisors. The education intervention given to the pregnant women covered the following topics: overview of what stem cells are, potential benefits of cord blood banking, the diseases treated by stem cells, HLA typing, how the processing and storage of stem cells takes place, and different options available for banking. All answers were recorded by the consent of the subject and the privacy of the recorded answers was maintained to the highest standards of the ethical values. The survey was constructed in two languages, English and Arabic, since our main focus was UAE pregnant women, all the survey were recorded in Arabic. The Arabic responses were translated into English by a native English speaker. No confidential information such as Name, contact details were requested from the respondents.

The questions asked for this survey were:

Prior to Educational Intervention:

- 1) Do you have any basic knowledge about cord blood banking?
- 2) Do you have any knowledge about cord blood treatment?
- 3) Would you consider storing your baby's umbilical cord?
- 4) Would you like to know more information about cord blood banking?

Post Educational Intervention:

- 5) Have you been educated and have sufficient knowledge on the importance of cord blood banking?
- 6) Would you consider banking your babies cord blood?

Results

All the data collected were analyzed using MS-Excel and the statistical methods were used to test the hypothesis. The aim of this study was researched using the percentage and chi-square testing. A confidence interval of 95% is used in the analysis of Chi-Square testing and the threshold p-value for the significance was $p < 0.05$.

Analysis/Discussion

This is the first UAE based survey to date concerning umbilical cord blood banking education, and it is the first to explicitly assess the knowledge, education, decision and future practice of expectant mothers.

The percentage method was used to compare the results as only the indicated number of women surveyed did answer all questions in the survey. The percentage among different group of questions also serves as the expected answers out of 100. Hence, this standardized the method of our comparison.

The core question for the survey was question 1 and 2, which focused on assessing the knowledge of pregnant mothers on cord blood banking. We see that almost 66% of the subjects have some very basic knowledge of the cord blood banking, but nearly 34% of the people were not aware about the cord blood treatments. Table 5.

| Question | Do you have any basic knowledge about cord blood banking? Prior to Education | % | Do you have any knowledge about cord blood treatment? | % | Would you consider storing your baby's umbilical cord? Prior to Education | % | Would you like to know more information about cord blood banking? | % | Have you been educated and have sufficient knowledge on the importance of cord blood banking? Post Education | % | Would you consider banking your babies cord blood? after the education given | % |
|----------|--|------|---|------|---|------|---|------|--|------|--|------|
| Yes | 481 | 66% | 166 | 23% | 113 | 16% | 637 | 91% | 629 | 88% | 648 | 91% |
| No | 244 | 34% | 556 | 77% | 600 | 84% | 62 | 9% | 87 | 12% | 66 | 9% |
| Total | 725 | 100% | 722 | 100% | 713 | 100% | 699 | 100% | 716 | 100% | 714 | 100% |

Table 5: Questions & Number and percentages of responses

The number of responses is differs due to unanswered questions.

| Cord Blood Knowledge Questions | Responses (Yes) | Responses (No) | Total Response |
|---|------------------|-----------------|----------------|
| Do you have any basic knowledge about cord blood banking? Prior educational intervention | 481 | 244 | 725 |
| % | 66% | 34% | |
| Have you been educated and have sufficient knowledge on the importance of cord blood banking? Post educational intervention | 629 | 87 | 716 |
| % | 88% | 12% | |
| Cord Blood Education Questions | Responses (Yes) | Responses (No) | Total Response |
| Would you consider storing your baby's umbilical cord? Prior educational intervention | 113 | 600 | 713 |
| % | 16% | 84% | |
| Would you consider banking your babies cord blood? Post educational intervention | 648 | 66 | 714 |
| % | 91% | 9% | |

Table 6: Knowledge, attitude & decision of pregnant women responses

Answers recorded for question 3 shows the attitude of the pregnant women towards the storage of cord blood. This answer was recorded before the education program was given. 84% of the subjects said that they didn't want to store their cord blood. There could be for many reason such as social, monetary, religious beliefs, or lack of knowledge about the uses for stem cells (Fig. 1). Subsequent studies can look to better understand the reasons why some decide against storing. Although 66% women had some knowledge of cord blood banking, still only 16% choose to store their cord blood before taking part in any education program.

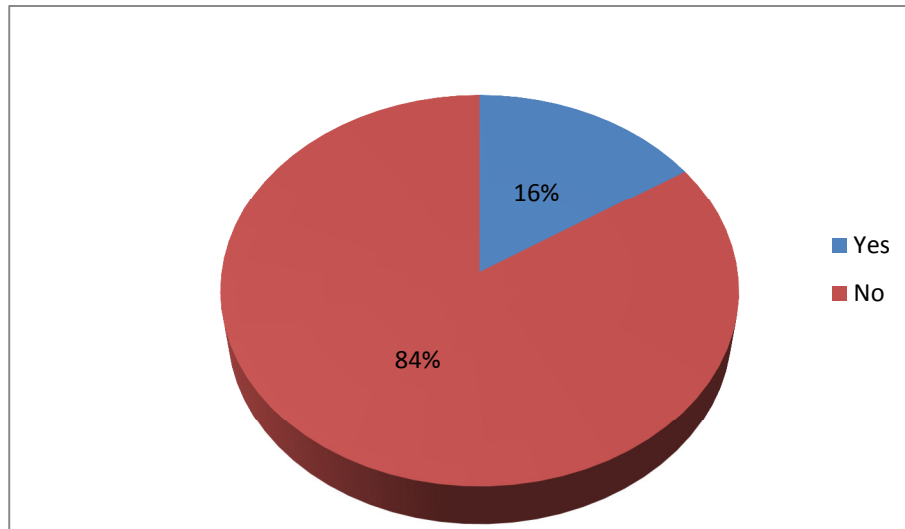


Figure 1:

Decision of pregnant women toward cord blood banking, prior to educational intervention

The most positive result of this study is that, although many subjects were not initially ready to consider cord blood banking, however nearly 91% of the subjects were interested in learning more. This shows a clear lack of education in the society and it highlights the need of revamping the education facilities for important medical topics in the society. In addition, it reflects that many pregnant mothers are interested in learning more about what products and services are available.

Also, we can see that there were only 16% women who said YES for the cord blood banking before the education. But after the education the percentage has gone up to 91% (Fig.2). That's a huge jump; this improvement is considerable as the first-time education has helped the women to change their attitude towards the cord blood banking.

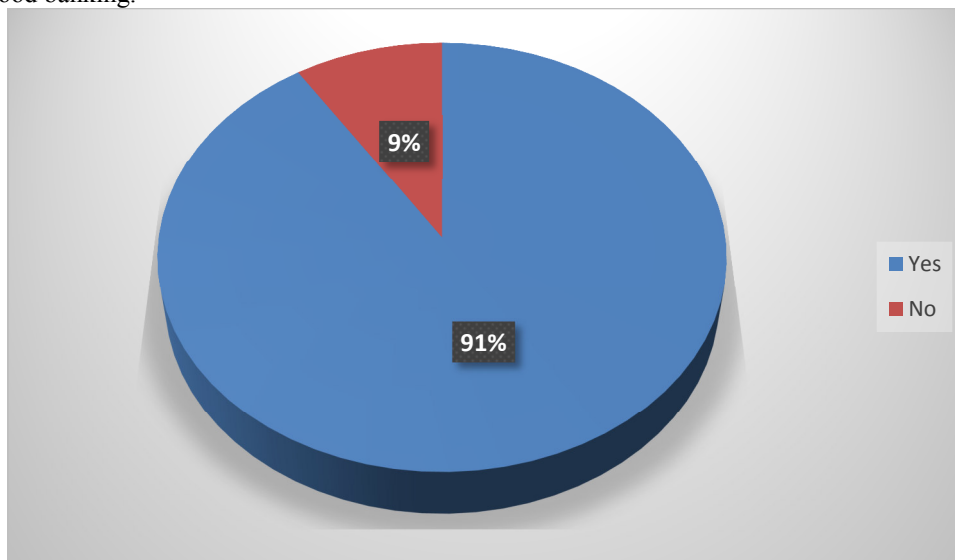


Figure 2:

Decision of pregnant women toward cord blood banking, post educational intervention

Similarly, the percentage of the women who now have some basic and sufficient knowledge of the cord blood banking has increased from the 66% to 88%. This proves the effectiveness of the education.

As the aim of this study is also to find out the effectiveness of the education program. Below are the details of the chi-square test which is used to test the hypothesis. The chi-square test clearly shows that the education helped a lot in getting positive turn outs for the cord blood banking and the subject felt that they have been educated well through the education program.

In the table 2 the chi-square value for both the YES and the NO has the values greater than the critical chi-square value. Hence, we reject the NULL hypothesis that there is no increase in the knowledge after the

education. And accept the Alternate Hypothesis that Education helped in gaining sufficient knowledge about the importance of cord blood banking.

Similarly, chi-square test has been performed to see if the education has helped in turning out more pregnant women to opt for the cord blood banking.

| Question | Do you have any basic knowledge about cord blood banking? If yes, what is the source of information | Have you been educated and have sufficient knowledge on the importance of cord blood banking? after education, list reasons | Chi-Square Value | Critical Chi-Square value |
|----------|---|---|------------------|---------------------------|
| Yes | 66.34483 | 87.84916 | 6.970195204 | 0.030651 |
| No | 33.65517 | 12.15084 | 13.74042579 | 0.001038 |

Table 2: Chi-Square test 1

In the table 3 the chi-square test has been done for the very important question, which is also one of the most significant aim of this study i.e. to see if the education helped to increase the number of women's who opt for the cord blood banking. As we can see that chi-square values for YES and NO are more than the critical chi-square values. Hence, we can reject the NULL hypothesis that there is no increase in the number of women for opting cord blood banking after the education. And accept the Alternate Hypothesis that Education helped in increasing the number of women for opting cord blood banking after the education.

| Question | Would you consider storing your baby's umbilical cord? before the education given | Would you consider banking your babies cord blood? after the education given | Chi-Square Value | Critical Chi-Square value |
|----------|---|--|------------------|---------------------------|
| Yes | 15.84853 | 90.7563 | 354.0502318 | 1.32E-77 |
| No | 84.15147 | 9.243697 | 66.67946032 | 3.32E-15 |

Table 3: Chi-Square test2

On analyzing the knowledge level of pregnant women regarding cord blood banking prior and post educational intervention, the educational intervention that was performed had statistically significant influence on it (p value <0.05). On analyzing the influence of the educational intervention on the decision and attitude of cord blood banking on the pregnant women prior and post the educational session, we see statistically significant positive attitude towards it (p value <0.05). (Table 4)

| | |
|-----------------------------|-------------|
| P | 0.05 |
| Cord Blood banking Decision | |
| P Value x ² | 1.69286E-93 |
| Cord Blood Knowledge | |
| P Value x ² | 5.34189E-06 |

Table 4: P values

Conclusion

The results of this study clearly show the knowledge, attitude and future practice among the UAE women are strongly dependent on the education about the cord blood given to them. The experiment clearly shows the high number of willingness of the women to learn about cord blood banking and medical importance, while the education has also proved the increase in the number of the pregnant women to opt for the cord blood banking.

Education to pregnant women should be given during their gestational period. Since most women in the study were receptive to learning more about cord blood banking. Hence, the education provided has played a significant role in determining the attitude of the women towards the cord blood banking.

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