

Cryopreservation Counseling and Its Effect on Knowledge and Attitude of Young Female Cancer Patients

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Abstract

This study was conducted with the purpose of assessing the effect of cryopreservation counseling on knowledge and attitude of young female cancer patients. Methods: Research Design: A quasi-experimental design (with pre and post test). Tools: Three instruments were used throughout the course of this study: (I) interviewing questionnaire, (II) knowledge assessment sheet and (III) attitude scale. Main results: There was a highly statistically significant difference between knowledge and attitude scores at the pre and post test. Conclusion: both study hypotheses were accepted. Young female cancer patients' score of knowledge about cryopreservation was increased after counseling as compared to before. Young female cancer patients' score of attitude about cryopreservation was increased after counseling as compared to before. Recommendations: The present study can be replicated on a large sample to act as a baseline data for pre-treatment program for raising awareness about fertility preservation. Female with cancer should be managed through a multidisciplinary approach and should receive counseling from an obstetrician and gynecologist about possible effects of chemotherapy and radiotherapy.

Keywords: cryopreservation, counseling, knowledge, attitude and cancer patients.

1. Introduction

1.1 Operational Definitions:

Counseling: pre-planned sessions delivered to small group of young female cancer patients with the aim of improving their knowledge and modifying their attitude toward cryopreservation.

Young female cancer patients: female aging from 20 to 25 years diagnosed with any type of cancer and are going to be treated with chemotherapy or radiotherapy on the pelvic region.

Cryopreservation: The process of taking a tissues of the ovary and carry out slow freezing at temperature of 196 °C/-321 °F before storing it in liquid nitrogen. Tissue can then be thawed and implanted where it starts to produce new ova, allowing normal conception to occur.

Knowledge: Understanding of information about cryopreservation that young female have before and after series of counseling sessions. In the current study; it was assessed using "knowledge assessment sheet"

Attitude: The tendency to respond positively or negatively towards the idea of cryopreservation before and after series of counseling sessions. In the current study; it was assessed using "women's attitude scale"

With recent advance in cancer treatment; chemotherapy and radiotherapy become more effective than before and cancer patients often have a good long-term prognosis which allow them to live healthy life. One major aspect of healthy life includes fulfilling their need to have a child (Dittrich 2016). Many chemotherapy and radiotherapy regimens may be gonadotoxic, and a possible irreversible diminish or total loss of ovarian reserve may result (Isachenko V, Mallmann 2014).

Loss of fertility represents one of the major long-term complications of chemotherapy and radiotherapy used for treating lymphoma, leukaemia and other malignancies in young women. (Dittrich R, Lotz 2015). The gonadotoxic effect of different chemotherapy regimens is various. The effect may involve a variety of pathophysiologic mechanisms. Tissues with high turnover such as ovarian follicles and bone marrow are more susceptible to the toxic effect of alkylating agents which are the most gonadotoxic chemotherapeutic medications (Khan-Dawood 2016). Alkylating agents may lead to direct destruction of oocytes and result in follicular depletion which may cause ovarian cortical fibrosis and damage of ovarian blood vessels. The recorded incidence of premature ovarian failure after different types of cancer and chemotherapy regimens can differ, and depend mainly upon the chemotherapeutic doses used and age range female (Carmeliet 2013).

Radiation treatments depends on the use of high-energy rays to kill cancer cells. These rays can also damage woman's ovaries. When a woman getting radiation therapy to the abdomen or pelvis, infertility depends on the amount of radiation absorbed by the ovaries. High doses may damage some or all of the eggs and the ovaries and cause infertility and early menopause. Most women getting pelvic radiation will lose their fertility. In some instances radiation to brain may affect pituitary gland and interferes with signals to ovaries to make hormones affecting ovulation. This may affect fertility depending on the focus and dose of the radiation (Metzger, Meacham & Patterson 2013; National Cancer Institute, 2017)

The recent increase in cancer prevalence and the increase in survival rate have initiated a wide interest in

fertility preservation among young females underwent gonadotoxic chemotherapy and radiotherapy (Donnez J, Jadoul 2015). Fertility loss following chemotherapy or radiotherapy as a cancer treatment can negatively affect young females (Loprinzi CL, Wolf SL, Barton DL, et al., 2011, Tschudin S, Bitzer J., 2013). New researches assured that the possible loss of fertility has a great impact on young female and may be, sometimes, more serious than the cancer diagnosis itself from their point of view (Schover LR, 2010, Partridge AH, Gelber S, Peppercorn J, et al., 2014). Statistics published by "Surveillance Epidemiology and End Results" SEER (2016), shows that about 120,000 young female diagnosed with cancer each year in the United States. However, only 34–72% of them had a discussion session about the negative effects of chemotherapy and radiotherapy on future fertility (Tschudin S, Bunting L, Abraham J, et al., 2012).

Health care providers have declared many reasons for lack of such discussion with female patients, including: poor knowledge about the new trends in fertility preservations, insufficient time to discuss the issue, the concept that females can not delay chemotherapy or radiotherapy until fertility preservation method is done, in addition to the idea that if females did not raise the issue themselves they were not interested in discussion sessions (Quinn GP, Vadapampil ST, Lee JH, et al., 2013). Moreover, most females have these sessions just before starting cancer treatment and so they believe that they have no time to visit an obstetrician without delaying planned chemotherapy (Madrigano A, Westphal L, Wapnir I, 2010). As a result; the risk of chemotherapy associated-infertility and premature artificial menopause is a top concern for such group of female (Carter J, Rowland K, Chi D, et al., 2015, Wenzel L, Dogan-Ates A, Habbal R, et al., 2015).

Recent studies showed that up to 75% of young female cancer patients are interested in having children after a cancer diagnosis and treatment. If young females are not counseled about the risks imposed by chemotherapy or radiotherapy to their fertility, they may lose available chance of preserving their fertility before starting cancer treatment (Lee SJ, Schover LR, Partridge AH, et al., 2012).

Over the past years; major advancements have been made in the field of egg, sperm and embryo cryopreservation. Young female with diagnosed with cancer must be informed about different available options to use for fertility preservation (Letourneau JM, Melisko ME, Cedars MI, et al., 2011). The recommendations of the American Society of Clinical Oncology are that young female who might want children after cancer treatment should be counseled about different fertility preservation modalities (Lee SJ, Schover LR, Partridge AH, et al., 2012).

There are many available proposed options for fertility preservation among young female undergoing gonadotoxic chemotherapy or radiotherapy regimens. Amongst are transposition of ovaries, embryo freezing, unfertilized metaphase-II ova and ovarian tissue cryopreservation (Weissman A, Gotlieb 2016). Ovarian tissue cryopreservation with a possible re-transplantation is a successful method to preserve fertility in young female underwent gonado-toxic chemotherapy (Wood T W, Montali 2016). Nowadays, a lot of cases have been recorded around the world reporting live births after re-transplantation from cryopreserved ovarian tissue (Isachenko E, Isachenko 2013).

The initial time of ovarian transplant with cryopreserved ovarian tissue was done at the year 1999 by Dr Kutluk Oktay. Five years later and at 2004 Prof Donnez in Belgium reported the 1st successful birth from a frozen ovarian tissue. In 1997 tiny samples of ovarian cortex were obtained from a woman with Hodgkin's lymphoma and cryo-preserved in a rate freezer (Planer, UK) and then stored in liquid Nitrogen. In the year 2003, chemotherapy was started for a young female case and after she had premature ovarian failure; auto-transplantation of ovarian cortical tissue was performed using laparoscopy. Five months following re-implantation, investigations showed establishing of regular ovulatory cycles. 11 months later; pregnancy was confirmed, which resulted in a live birth – "Tamara".

Counseling is the use of interactive process directed toward the health needs or problems of the individual and significant others to improve or support coping with disease or health problem. Nurses play a vital role in helping young female cancer patients in making health behaviour changes through upgrading their knowledge, modifying attitude toward cryopreservation (EdwinFrancis et al., 2016).

Cancer patient counseling has been considered as one of the effective measures to improve knowledge about and attitude toward cryopreservation. In the absence of proper counseling, female patients may not have enough information about the chance to freeze a part of their ovarian tissues to preserve their fertility. Lack of counseling may lead to loss of fertility preservation chance. Thus, healthcare providers, especially nurses who deal with cancer patients should be familiar with the new trends in fertility preservation modalities for providing optimal therapeutic services. (McLeod, J, 2013 and Shayo, E, 2011).

1.2 Significance of the Study:

Based upon results of National Cancer Registry Program (NCRP) for the year 2014; the incidence rates of reproductive cancer at national and regional level of Egypt for the current study age group per 100,000 was 157.0. By the year 2050, a three folds increase in the incidence of cancer compared to 2014 was estimated. (Amal S. Ibrahim, Hussein M. Khaled, Nabil NH Mikhail, Hoda Baraka, and Hossam Kamel, 2014).

The incidence of reproductive cancer is increasing over time. With such increased incidence and great complications resulting from treatment options, the American Society of Clinical Oncology (ASCO) has developed guidelines for oncology health care providers about possible fertility preservation modalities and related issues (Lee SJ, Schover LR, Partridge AH, et al., 2012); health care providers should first and before all explain the possibility of infertility with young females during and be ready to discuss possible fertility preservation methods or refer appropriate and interested females to reproductive specialists as early as possible during treatment planning.

Studies showed that receiving specific counseling about reproductive loss associated with chemotherapy or radiotherapy for reproductive cancer treatment and pursuing fertility preservation are associated with promising results. Results include less sadness and good quality of life; however few cancer patients are exposed to this potential benefit of counseling. Young females should have proper counseling and be given the chance to make active decisions about their fertility preservation (Canada AL, Schover 2014).

The effect of fertility preservation counseling on knowledge and attitude in a large population of young females has not been reported in the available body of literature which represents a gap of knowledge. The current study tries to fill in such gap by studying the effect of counseling on cancer patients' knowledge and attitude.

1.3 Purpose of the Study:

This study was conducted with the purpose of assessing the effect of cryopreservation counseling on knowledge and attitude of young female cancer patients

1.4 Research Hypotheses

Young female cancer patients' score of knowledge about cryopreservation will increase after counseling as compared to before.

Young female cancer patients' score of attitude about cryopreservation will increase after counseling as compared to before.

2. Methods:

2.1 Research design:

A quasi-experimental design (with pre and post evaluation of female knowledge and attitude).

2.2 Setting:

The study was conducted at the oncology institute at Menofia University. This institute was selected purposively as it is known to present health care to large sector of the governorate population thus having a high flow rate.

Participants of the study were purposively selected according to the inclusion criteria:

Single females, aging from 20 to 25 years

Diagnosed with any form of cancer

Going to be treated with chemotherapy or radiotherapy on the pelvic region (alone, after or before surgery)

Willing to participate in the study

At least with basic education

Never received counseling about the current study topic.

Exclusion criteria:

Uterine cancer going to have hysterectomy

The sample size was calculated using Epi Info (2017) program depending on review of past literature Shimizu et al., 2013 "knowledge, attitude, and behaviors regarding fertility issues for young female cancer patients" study participants who received the intervention, showed significantly higher knowledge and attitude score scores at the post test measurement compared to the pre test ($t=2.39$, $p = 0.020$; $t=-2.71$, $p = 0.009$).

Based on this data sample size was calculated at: Power 80%, confidence level 95% and margin of error 0.05. Accordingly, the calculated minimum sample size required was 100 participants.

2.3 The filed work:

The data collection was conducted from August 2017 to July 2018.

Maneuver of Intervention: The current study was conducted through three main phases: preparatory, implementation and evaluation phases.

Preparatory Phase: A detailed reviewing of electronic data related to cancer, chemotherapy, radiotherapy, counseling skills for the age group (20-25 years) and cryopreservation was done. A review of literature to collect possible study-related knowledge was used in developing data collection instruments. The contents of the counseling sessions were collected and then translated into Arabic. The contents were prepared in many forms: PowerPoint presentations and a guiding booklet. Finally; the data collection instruments and the booklet were

submitted for revision by a jury of expertise.

Implementation Phase:

Participants were selected based on the previously mentioned inclusion criteria.

The researchers selected about 9 young females per month and visited the institute 2 days per week.

Study participants were divided into subgroups of (3-5) young females to receive the sessions. Each session lasted for 20 minutes. The counseling sessions were as follows:

- Session 1: the purpose of the study, steps of intervention, obtaining an oral informed consent, sitting time for other counseling sessions and identifying methods of contacting with the researchers. Using study instruments I, II and III the pre-test of knowledge and attitude was done. At the end of the session the guiding booklet was given to female.
- Session 2: general knowledge about cancer and its effect on fertility.
- Session 3: fertility preservation techniques in general.
- Session 4: cryopreservation (part I).
- Session 5: cryopreservation (part II).

The intended learning outcomes of the counseling sessions were:

Knowledge and understanding:

Define cryopreservation.

List the fertility preservation techniques.

Memorize advantages of cryopreservation.

Intellectual skills:

Recognize benefits of cryopreservation

General and transferable skills:

Value the importance of cryopreservation as a modality for fertility preservation.

Attitude: Communicate effectively with the researchers later on to take steps toward cryopreservation.

Session contents

Session 2: general knowledge about cancer and its effect on fertility.

Definition of cancer

Fertility issues

Effect of cancer on fertility

Effect of chemotherapy on fertility

Effect of radiotherapy on pelvic region on fertility

Session 3: fertility preservation techniques in general.

Cryopreservation of unfertilized human oocytes

Ovarian tissue cryopreservation

Embryo cryopreservation

Fertility-sparing surgery

Transposition of the ovaries

Session 4: cryopreservation (part I)

Definition

Advantages

Benefits

Process and steps

Session 5: cryopreservation (part II)

Offering centers

Cost

Timing

Teaching Materials: PowerPoint presentation displayed by lab top computer, video explaining the process of cryopreservation and printed copy of the sessions' contents

Evaluation Phase: At the last session, the researchers conducted the post-test using instruments II and III. Participants were thanked for their valuable participation and time.

2.4 Data Collection Instruments:

Three instruments were used throughout the course of this study: (I) interviewing questionnaire, (II) knowledge about cryopreservation and (III) attitude toward cryopreservation.

(I) Interviewing questionnaire {*}: It consisted of the following parts: A. Assessment of socio-demographic data (age, educational level, occupation, residence and income), B. Medical history (as data about current diagnosis, duration, planned type of chemotherapy, number of planned doses and radiotherapy sessions).

(II) Knowledge about cryopreservation {*}: used to assess young female's knowledge about cryopreservation

before and after counseling. It consisted of ten closed ended questions. The instrument was scored as: 2 for correct answer, 1 for do not know and 0 for wrong answer. The total score ranged from 0 to 20. Poor knowledge score ranged between 0 and 7, average knowledge score ranged between 8 and 15, and good knowledge score ranged between 16 and 20.

(III) Attitude toward cryopreservation {*}: used to assess young female's attitude toward cryopreservation. It was a three Points Likert Scale: (0) disagree, (1) neutral and (2) agree. It consisted of ten statements. The total score ranged from 0 to 20. A total score of 0 to 10 indicated negative attitude and a total score of 10 to 20 indicated positive attitude. {*} Instrument was developed by the researchers and revised by a jury of qualified experts, then tested for validity and reliability.

Validity of the instruments was ascertained by a group of qualified subject area experts, medical and nursing staff who reviewed the tool for content validity. They were asked also to judge the items for completeness and clarity. Suggestions were incorporated into the instruments.

Test-retest reliability was applied by the researchers for testing the internal consistency of the instruments. It is the administration of the same instrument to the same participant under similar conditions on two or more occasions.

2.5 Ethical Consideration: Official steps were taken to obtain a permission to conduct the study from Faculty of Nursing, Menofya University, with explanation of the aim and the importance of the study to the institute authority. A verbal consent was obtained from all young females before participation in the study. They were assured that their information were confidential and only used for study process.

2.6 Piloting the Instruments: A Piloting was conducted on ten young female to test the applicability of the instruments and to estimate the time needed for data collection. On the basis of the piloting results the researchers determined the feasibility of data collection procedures, developed the sessions schedule.

2.7 Statistical Data Analysis: The current collected data were tabulated and analyzed using statistical package for the social science (SPSS) software version 20 on IBM compatible computer. Quantitative data were expressed as mean & standard deviation ($X \pm SD$). Categorical variables comparison was done using Chi square (χ^2) test. Continuous quantitative variables were compared using paired t test. For two large continuous variables, Pearson (r) correlation coefficient was calculated. P-value at 0.05 was used to determine significance regarding: P-value > 0.05 to be statistically insignificant (NS), P-value \leq 0.05 to be statistically significant (S) and P-value \leq 0.001 to be high statistically significant (HS).

3. Results:

Table 1: Sociodemographic characteristics of the studied participants

Variable	N =100	
	No	%
Age		
Mean \pm SD	22.5	2.5
Level of education		
Basic	4	4%
Secondary	38	38%
University	57	57%
Post-graduate	1	1%
Residence		
Urban	26	26%
Rural	74	74%
Number of family members		
2-5	60	60%
6-8	27	27%
9-11	13	13%
Employee		
Yes	21	21%
No	79	79%

Table 1 shows the distribution of the studied female according to their socio-demographic characteristics. The mean age was 22.5 years. Nearly half of the studied sample (57%) was highly educated. As for the residence; 74% were rural residents. 21% of the sample was employee.

Table 2: Medical history of the studied participants

Variable	N =100	
	No	%
Duration since diagnosis per months		
Mean ± SD	4±1.5	
Planned treatment type		
Chemotherapy only	38	38%
Chemotherapy then surgery	26	26%
Surgery then chemotherapy	18	18%
Radiotherapy on pelvic region	18	18%
Type of reproductive cancer		
Breast	41	41%
Liver	7	7%
Blood	8	8%
Bone marrow	5	5%
Brain	3	3%
Ovary	36	36 %

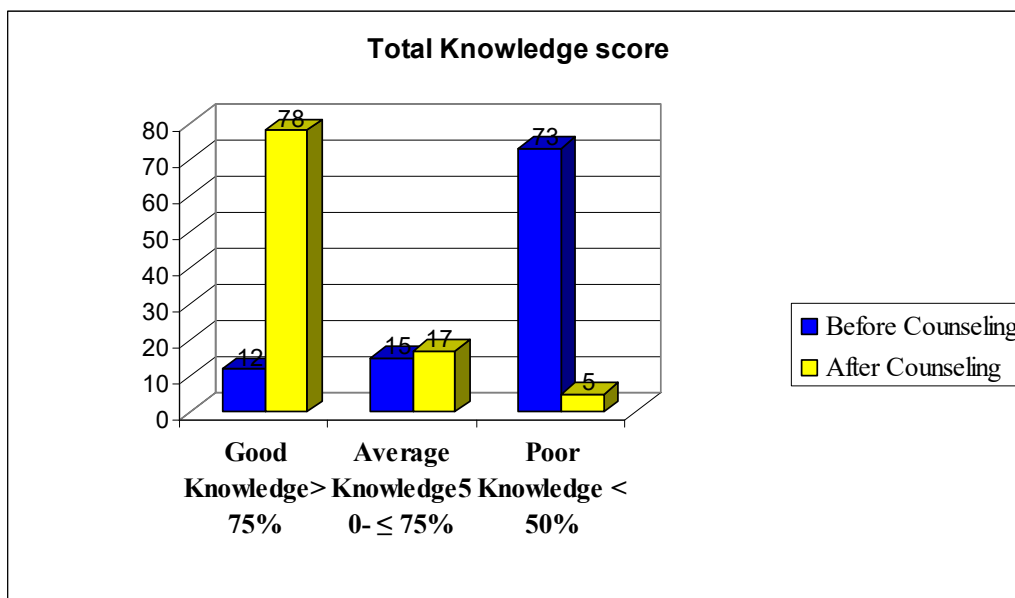
The medical history of the studied participants is shown in table 2. The mean time since diagnosis of cancer was 4 months. 38% of the studied participants was planned to be treated with chemotherapy only while the other half was planned to be treated with a combination of chemotherapy and surgery or radiation.

Table 3: Knowledge about cryopreservation before and after counseling

Variable	Before Counseling			After Counseling			χ^2 test P value
	Correct %	Wrong %	Don't know %	Correct %	Wrong %	Don't know %	
Do you know the effect of chemotherapy/radiotherapy on fertility?	16	23	61	87	6	7	$\chi^2=42.27$ P<0.001*
Do you think that chemotherapy/radiotherapy lead to infertility?	18	14	68	91	2	7	$\chi^2=72.14$ P<0.001*
Some types of chemotherapy/radiotherapy can affect fertility	9	9	82	73	14	13	$\chi^2=82.61$ P<0.001*
Do you know what cryopreservation is?	0	9	91	68	4	28	$\chi^2=78.13$ P<0.001*
What are the benefits of cryopreservation?	0	4	96	92	3	1	$\chi^2=79.29$ P<0.001*
Cryopreservation should be done before chemotherapy/radiotherapy only as fertility preservation method?	0	92	8	89	8	3	$\chi^2=81.14$ P<0.001*
Only young female can have cryopreservation.	4	86	10	92	6	2	$\chi^2=82.19$ P<0.001*
What is the cost of cryopreservation?	0	2	98	97	2	1	$\chi^2=88.01$ P<0.001*
Where it can be done?	0	0	100	94	4	2	$\chi^2=71.10$ P<0.001*
What is its expected success rate of fertility preservation?	0	0	100	92	6	2	$\chi^2=79.01$ P<0.001*
Mean and SD of total knowledge score	3.73±3.34			15.13±2.07			$\chi^2=31.4^{**}$ P<0.001*

(*) Statistically significant at $p<0.001$, (**) Paired t- test

Table 3 shows that there was a statistically significant improvement in all items of knowledge after counseling as compared to before ($P<0.001$). Before counseling, the mean and standard deviation of total score of knowledge was poor (3.73±3.34), while at the post-intervention; there was an improvement (15.13±2.07).



Paired t- test 31.54 P=0.000

Figure 1: Comparison between total knowledge score before and after counseling

Figure 1 displayed that, the majority of studied females had poor knowledge level before counseling (73%). However, after counseling 78% of females had good knowledge level.

By observing table 3 and figure 1, the first study hypothesis "Young female cancer patients' score of knowledge about cryopreservation will increase after counseling as compared to before." was accepted.

Table 4: Attitude toward cryopreservation before and after counseling

Variable	Before counseling			After counseling			χ^2 test P value	
	Agree	Neutral	Disagree	Agree	Neutral	Disagree		
I am concerned about preserving my fertility before starting chemotherapy/ radiotherapy	18	45	37	97	1	2	$\chi^2=75.71$ P=0.000*	
I support cryopreservation before chemotherapy/ radiotherapy as fertility preservation method?	17	67	16	96	1	3	$\chi^2=74.93$ P=0.000*	
Without cryopreservation/ radiotherapy I will be childless	23	26	51	89	2	9	$\chi^2=81.24$ P=0.000*	
I think that having cryopreservation will have negative impact on my relationship with future spouse?	2	75	23	3	12	85	$\chi^2=68.12$ P=0.000*	
If I have cryopreservation, I will inform my friends and relatives?	17	2	81	83	8	9	$\chi^2=91.05$ P=0.000*	
If one need cryopreservation, the decision should be taken by self, parents and physician only	20	68	12	59	32	9	$\chi^2=34.96$ P=0.000*	
A future child should never know that he/she is born after fertility preservation	94	3	3	3	0	97	$\chi^2=71.72$ P=0.000*	
It is necessary to have psychological counseling before cryopreservation	9	82	9	93	2	5	$\chi^2=41.10$ P=0.000*	
I agree with advertisement on cryopreservation in the mass media	27	4	69	95	2	3	$\chi^2=34.17$ P=0.001*	
I think that I will preserve fertility through cryopreservation	10	89	1	98	2	0	$\chi^2=28.52$ P=0.001*	
Mean and SD of attitude score		8.99±2.79			14.30±2.10			t=34.16** P<0.001

(*) Statistically significant at $p < 0.001$, (**) Paired t- test

All items of attitude were statistically significant improved after counseling as compared to before ($P < 0.001$). The mean and standard deviation of total attitude score was (8.99±2.79) before counseling and improved to (14.30±2.10).

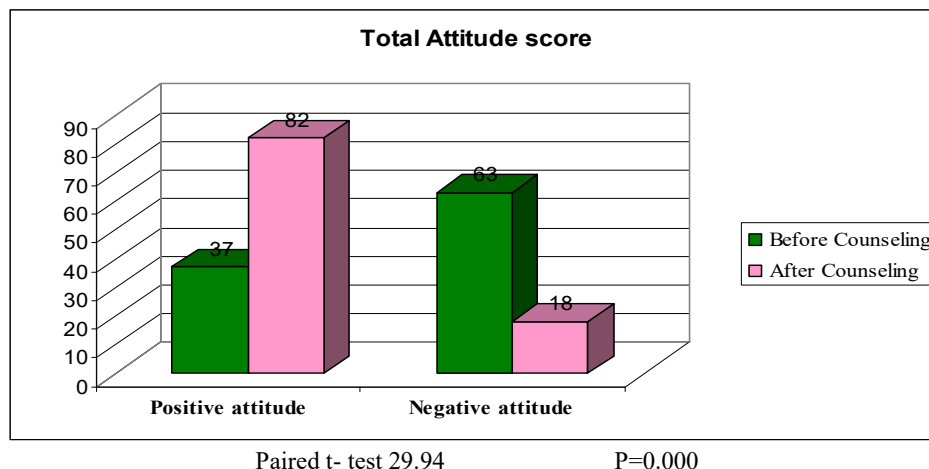


Figure 2: Comparison between total attitude score before and after counseling
 Figure 2 show that, only 37% of studied females had positive attitude toward cryopreservation. As a result of counseling, the percentage of positive attitude increased to 82%.
 By observing table 4 and figure 2, the second study hypothesis "Young female cancer patients' score of attitude about cryopreservation will increase after counseling as compared to before." was accepted.

Table 5: Correlation between total knowledge and total attitude scores before and after counseling

Variable	Total knowledge score	
	before counseling	after counseling
Total attitude score before counseling	r=0.49*	-
	p = 0.000 **	
after counseling	-	r= 0.78*
		p =0.000 **

(*) Pearson's correlation, (**) Statistically significant at $p \leq 0.001$

This table showed a significant, positive correlation between knowledge and attitude before and after counseling ($r=0.49$, $r=0.78$ respectively). The more increased in knowledge score, the more positive attitude young female had.

4. Discussion

Cancer and its related treatment modalities (chemotherapy or radiotherapy) are known to result in infertility. In the past, women there were limited options available to preserve female fertility. Now many techniques are available for protecting ovarian tissue from the negative effects of chemotherapy and radiation (Meirow, 2012). Despite the presence of advanced measures, little information is known by cancer patients. The current study found that young females have poor knowledge about cryopreservation.

The current studied participants were all young females (20-25 years) diagnosed with cancer and are planned to receive chemotherapy or radiotherapy. This age group was purposively selected as the study topic seen to be vital for young female. Many studies were published showing different sample nature. For example, Schover L, Rybicki L, Martin B, et al (2012) in their study "having children after cancer: A pilot survey of survivors' attitudes and experiences" reported that fertility preservation techniques were not attractive to the studied sample. The difference is seen to be due to selecting a group including married females who had completed their family number.

Regarding studied females' knowledge about cryopreservation, the current study finding showed a statistically significant improvement in their knowledge after counseling as compared to before. This finding was supported by that of Revel A, Laufer N. (2012) about protecting female fertility from cancer therapy. The aforementioned study reported that nearly half of the sample had poor knowledge score and only one fourth had good knowledge score. This finding was also in harmony with Goldfarb, et al., (2013) who studied "Female knowledge, attitude and practices regarding fertility preservation". This study showed that awareness about fertility preservation was poor among the studied population and only half of them were aware of the idea of fertility preservation. The published poor knowledge and awareness levels in different studies is seen to be due to that fertility preservation is a new trend and still not widely known by young females.

Regarding young females' attitude towards cryopreservation, the current study findings showed an improvement in attitude after counseling as compared to before. This can be explained by the idea that, receiving detailed explanation through a series of counseling sessions resulted in attitude modifications. This finding was

agreed upon by a study by Gerber B, Dieterich M, Muller H, Remer T (2011) about controversies in attitude toward preservation of ovary function and fertility in patients with breast cancer and reported that studied sample had good attitude toward preservation of ovary function at the post test. Moreover, Collins IM, Fay L, Kennedy MJ (2011) in their study about "strategies for fertility preservation after chemotherapy: awareness among Irish cancer women" found that application of counseling sessions resulted in an improvement in attitude toward the studied topic.

The current study results showed the presence of significant positive correlation between knowledge and attitude total scores after compared to before counseling application. In other terms, the higher total knowledge score, the more positive attitude a young female had and vice versa. With poor knowledge level, there will be negative attitude. Arafa MA, Rabah DM (2012) studied attitudes and practices of women toward fertility preservation and reported a positive correlation between knowledge and attitude. Quinn GP, Vadaparampil ST, Lee JH, Jacobsen PB, Belper G, Lancaster J, et al., (2014) studied "fertility preservation in oncology patients: a national study of practice behaviors" reported a similar correlation between score of knowledge and attitude. Jennings E, Hilders CG, Louwe LA, et al., (2013) studied "female fertility preservation: Knowledge, attitude, practical and ethical considerations of an underused procedure" and yield results contradicting the current study. The contradiction in results may be due to the difference in sample nature as the aforementioned study reported recruiting females from different ethical backgrounds and some of them considered any fertility preservation technique against Good's well and ethically prohibited.

The increase in knowledge and attitude total scores was seen to be a result of counseling sessions. By reviewing literature it was found that, many studies examined the effect of educational intervention, structured teaching programme and counseling. Such studies reported an improved knowledge level and attitude after mentioned intervention (Lee SJ, Schover LR, Partridge AH, et al., 2012) The similarity of results assured the concept that the role of the nurse as a counselor is very important in improving knowledge and modifying attitude toward new modalities and techniques.

5. Conclusion

Based on the results of the current study; it can be concluded that the study hypotheses were both accepted. Young females' score of knowledge about cryopreservation was increased after counseling as compared to before. Young females' score of attitude about cryopreservation was increased after counseling as compared to before.

6. Recommendations

The present study can be replicated on a large sample to act as a baseline data for pre-treatment program for raising awareness about fertility preservation.

Female with cancer should be managed through a multidisciplinary approach and should receive counseling from an obstetrician and gynecologist about possible effects of chemotherapy and radiotherapy.

Educational programs about cryopreservation should be implemented to oncology staff nurses as a step toward disseminating such knowledge among females

References

- Loprinzi CL, Wolf SL, Barton DL, et al. Symptom management in premenopausal patients with breast cancer. *Lancet Oncol.* 2011; 9:993–1001. [PubMed: 19071256]
- Tschudin S, Bitzer J. Psychological aspects of fertility preservation in men and women affected by cancer and other life-threatening diseases. *Hum Reprod Update.* 2013; 15:587–97. [PubMed: 19433413]
- Schover LR. Patient attitudes toward fertility preservation. *Pediatr Blood Cancer.* 2010; 53:281–4 [PubMed: 19301387]
- Partridge AH, Gelber S, Peppercorn J, et al. Web-based survey of fertility issues in young women with breast cancer. *J Clin Oncol.* 2014
- Tschudin S, Bunting L, Abraham J, et al. Correlates of fertility issues in an internet survey of cancer survivors. *J Psychosom Obstet Gynaecol.* 2012; 31:150–7. [PubMed: 20718586]
- NCIFastStats. Statistics stratified by age. Surveillance Epidemiology and End Results (SEER). [online]. 2016. <http://seer.cancer.gov/faststats/elections.php>
- Quinn GP, Vadaparampil ST, Lee JH, et al. fertility preservation in oncology patients: a national study of practice behaviors. *J Clin Oncol.* 2014; 27:5952–7. [PubMed:19826115]
- Madrigano A, Westphal L, Wapnir I. Egg retrieval with cryopreservation does not delay breast cancer treatment. *Am J Surg.* 2010; 194:477–81. [PubMed: 17826059]
- Carter J, Rowland K, Chi D, et al. Gynecologic cancer treatment and the impact of cancer-related infertility. *Gynecol Oncol.* 2015; 97:90–5. [PubMed: 15790443]

- Wenzel L, Dogan-Ates A, Habbal R, et al. Defining and measuring reproductive concerns of female cancer survivors. *J Natl Cancer Inst Monogr.* 2015;94–8. [PubMed: 15784834]
- Lee SJ, Schover LR, Partridge AH, et al. American Society of Clinical Oncology recommendations on fertility preservation in cancer patients. *J Clin Oncol.* 2012; 24:2917–31. [PubMed: 16651642]
- Letourneau JM, Melisko ME, Cedars MI, et al. A changing perspective: improving access to fertility preservation. *Nat Rev Clin Oncol.* 2011; 8:56–60. [PubMed: 20736926]
- Amal S. Ibrahim, Hussein M. Khaled, Nabel NH Mikhail, Hoda Baraka, and Hossam Kamel. Cancer Incidence in Egypt: Results of the National Population-Based Cancer Registry Program. *Journal of Cancer Epidemiology* Volume 2014, Article ID 437971, 18 pages
- Shimizu Chikako • Hiroko Bando • Tomoyasu Kato • Yuri Mizota • Seiichiro Yamamoto • Yasuhiro Fujiwara (2013) knowledge, attitude, and behaviors regarding fertility issues for young female cancer patients (2013) 20:230–240 DOI 10.1007/s12282-011-0328-8
- Meirow D. Ovarian injury and modern options to preserve fertility in female cancer patients treated with high dose radio-chemotherapy for hemato-oncological neoplasias and other cancers. *Leuk Lymph.* 2012;33:65–76.
- Schover L, Rybicki L, Martin B, et al. Having children after cancer. A pilot survey of survivors' attitudes and experiences. *Cancer.* 2012;86:697–709.
- Revel A, Laufer N. Protecting female fertility from cancer therapy. *Mol Cell Endocrinol.* 2012;187:83–91.
- Goldfarb S, Dickler M, McCabe M, Thom B, Jia X, Hudis C, et al. female knowledge, attitude and practices regarding fertility preservation. *J Clin Oncol.* 2013;28(15 Suppl):e19525.
- Gerber B, Dieterich M, Muller H, Remer T. Controversies in attitude toward preservation of ovary function and fertility in patients with breast cancer. *Breast Cancer Res Treat.* 2011;108:1–8.
- Collins IM, Fay L, Kennedy MJ. Strategies for fertility preservation after chemotherapy: awareness among Irish cancer women. *Ir Med J.* 2011;104:6–9.
- Arafa MA, Rabah DM. Attitudes and practices of women toward fertility preservation. *J Hematol Oncol.* 2012;33: 203–7.
- Quinn GP, Vadaparampil ST, Lee JH, Jacobsen PB, Belper G, Lancaster J, et al. Physician referral for fertility preservation in oncology patients: a national study of practice behaviors. *J Clin Oncol.* 2015;27:5952–7.
- Jenninga E, Hilders CG, Louwe LA, et al. Female fertility preservation: Knowledge, attitude, practical and ethical considerations of an underused procedure. *Cancer J.* 2013; 14:333–9. [PubMed: 18836340]
- Dittrich R, Maltaris T, Hoffmann I. et al. Fertility preservation in cancer patients. *Minerva Ginecol.* 2016;62:63–80. [PubMed]
- Isachenko V, Mallmann P, Petrunina A M. et al. Comparison of in vitro- and chorioallantoic membrane (CAM)-culture systems for cryopreserved medulla-contained human ovarian tissue. *PLoS ONE.* 2014;7:e32549. [PMC free article] [PubMed]
- Donnez J, Jadoul P, Pirard C. et al. Live birth after transplantation of frozen-thawed ovarian tissue after bilateral oophorectomy for benign disease. *Fertil Steril.* 2015;98:720–725. [PubMed]
20. Dittrich R, Lotz L, Keck G. et al. Live birth after ovarian tissue autotransplantation following overnight transportation before cryopreservation. *Fertil Steril.* 2015;97:387–390. [PubMed]
- Khan-Dawood F S, Yusoff Dawood M, Tabibzadeh S. Immunohistochemical analysis of the microanatomy of primate ovary. *Biol Reprod.* 2016;54:734–742. [PubMed]
- Carmeliet P. Angiogenesis in health and disease. *Nat Med.* 2013;9:653–660. [PubMed]
- Weissman A, Gottlieb L, Colgan T. et al. Preliminary experience with subcutaneous human ovarian cortex transplantation in the NOD-SCID mouse. *Biol Reprod.* 2016;6:1462–1467. [PubMed]
- Wood T W, Montali R J, Wildt D E. Follicle-oocyte atresia and temporal taphonomy in cold-stored domestic cat ovaries. *Mol Reprod Dev.* 2016;46:190–200. [PubMed]
- Isachenko E, Isachenko V, Nawroth F. et al. Effect of long-term exposure at suprazero temperatures on activity and viability of human ovarian cortex. *Fertil Steril.* 2013;91:1556–1559. [PubMed]
- Edwin Francis C., Deenajothy R., Hemamalini M. & Titus Immanuel D.C. (2016): Effectiveness of structured teaching program on knowledge regard stem cells and cord blood banking among antenatal mothers at Mmogappair, CHENNAI. *International Journal of Pharmacy and Biological Sciences*; 6 (1) 135-141.
- McLeod, J. (2013). *An introduction to counselling* fifth edition, McGraw-Hill Education (UK), pp6-7.
- Shayo, E. (2011). *Origin and development of guidance and counselling practice in Tanzanian school.* Retrieved June 2, 2011 from www.ezinearticles.com.
- National Cancer Registry Program of Egypt, <http://www.cancerregistry.gov.eg>.
- Canada AL, Schover LR. The psychosocial impact of interrupted childbearing in long-term female cancer survivors. *Psychooncology.* 2014(Epub ahead of print).
- Metzger ML, Meacham LR, Patterson B, (2013). Female reproductive health after childhood, adolescent, and young adult cancers: Guidelines for the assessment and management of female reproductive complications.