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Araştırma Makalesi– Research Paper

OOCYTE CRYOPRESERVATION: KNOWLEDGE AND ATTITUDES AMONG TURKISH MIDWIFERY AND NURSING STUDENTS

OOSİT KRİYOPREZERVASYONU: TÜRK EBELİK VE HEMŞİRELİK ÖĞRENCİLERİNİN BİLGİ VE TUTUMU

Ilkay Gungor SATILMIS[1], Gozde KUGCUMEN[2], Ozden TANDOGAN[3]

Özet

Tanımlayıcı tipteki bu çalışmanın amacı, Türk hemşirelik ve ebelik öğrencilerinin oosit kriyoprezervasyonuna yönelik tutumlarını değerlendirmektir. Çalışmanın örneklemini İstanbul'daki iki üniversitenin ebelik ve hemşirelik bölümlerinde okuyan 342 kız öğrenci oluşturmuştur. Araştırmaya katılmaya gönüllü öğrencilere sosyodemografik özellikleri, oosit kriyoprezervasyonu hakkındaki bilgi ve görüşlerinin yer aldığı anket formu online uygulanmıştır. Katılımcıların yaş ortalaması 20,96±1,8'dir. Öğrenciler yaklaşık 25 yaşında çocuk sahibi olmak istediklerini belirtmişlerdir. %59'u kriyoprezervasyon hakkında bilgilerinin olduğunu, %49,4'ü kariyeri için çocuk sahibi olmayı ertelemek için kullanabileceğini %57,6'sı ise kriyoprezervasyon ile kadınların annelik zamanını seçmede özgür olacaklarını belirtmiştir. Oosit kriyoprezervasyonunu daha çok tıbbi nedenlerle kabul edebilecekleri görülmektedir. Üreme hücrelerini etkileyen kanser tedavisi alacaklarsa (%78,9), yumurtalıkların etkilenmesine neden olacak cerrahi girişime maruz kalınmışsa (%78) ve erken yaşta menopoza girme riskleri varsa (%71,9) düşüneceklerini ifade etmişlerdir. Öğrencilerin oosit kriyoprezervasyonu hakkındaki tutumları olumlu olmakla birlikte, daha çok tıbbi açıdan gerekli olması durumunda oosit kriyoprezervasyonunu kabul edebilecekleri bulunmuştur.

Anahtar Kelimeler: Kriyoprezervasyon, oosit kriyoprezervasyon, sosyal oosit dondurma

Abstract

The objective of this descriptive study was to evaluate the attitudes towards oocyte cryopreservation among Turkish nursing and midwifery students. The sample consisted of 342 female students in midwifery and nursing departments of two universities in Istanbul. A questionnaire about their socio-demographic characteristics, knowledge and views about oocyte cryopreservation was applied online to the volunteer students. The average age of the participants was 20.96±1.8. The students wanted to have a baby at the age of 25 in average, 59% had knowledge about cryopreservation, 49.4% stated that they can use cryopreservation to postpone having children for their career and 57.6% agreed that women would be free to choose the motherhood timing thanks to cryopreservation. Students would think about it if they were going to have cancer treatment affecting the reproductive cells (78.9%), they underwent surgical intervention that would affect the ovaries (78%) and they were under the risk of going through early menopause (71.9%). Although the attitudes of students about oocyte cryopreservation were positive, it was found that they could accept oocyte cryopreservation mostly in case of a medical necessity.

Keywords: Cryopreservation, oocyte cryopreservation, social oocyte freezing

Geliş Tarihi (Received Date): 13.07.2022, Kabul Tarihi (Accepted Date): 07.09.2022, Basım Tarihi (Published Date): 30.09.2022 , [1] Florence Nightingale Faculty of Nursing, Istanbul University-Cerrahpasa, Istanbul, Turkey. **E-mail:** ilkay.gungorsatilmis@iuc.edu.tr, [2] Faculty of Health Sciences, Istanbul Medipol University, Istanbul, Turkey. **E-mail:** gkugcumen@medipol.edu.tr [3] Faculty of Health Sciences, Istanbul Arel University, Istanbul, Turkey. **E-mail:** ozdentandogan@arel.edu.tr, **ORCID ID's:** İ.G.S.; http://orcid.org/0000-0002-9446-6148, G.K.; http://orcid.org/0000-0001-7052-3817, Ö.T.; https://orcid.org/0000-0001-7439-5816.

1. INTRODUCTION

Significant progress has been made in the area of assisted reproductive technology from the birth of Luise Brown, the first in vitro fertilization (IVF) baby. These innovations in reproductive technologies, especially in oocyte cryopreservation, have raised a variety of problems. Today, the late-starting family life in many of the developed societies and the significant increase in the number of women postponing fertility have increased the popularity of oocyte cryopreservation among women who want to maintain their reproductive potential (Hodes-Wertz, Druckenmiller, Smith, & Noyes, 2013, pp.1343-1349; Wennberg, Rodriguez-Wallberg, Milsom, & Brännström, 2016, pp.38-44). For many women, the age of childbearing is delayed due to reasons such as the busy working life, career plans or having no suitable partner yet to start a family. While the childbearing age in Denmark is mostly 40 years according to the studies, it is observed that the age range with the highest fertility rate has raised from 20-24 ages to 25-29 ages in Turkey (Wennberg et al., 2016, pp.38-44; TDHS, 2018).

The first birth after oocyte cryopreservation is known to occur in 1986 in South Korea. Following this, it was reported the first live birth was given using a new cryopreservation method called 'vitrification' based on frozen oocytes in 1999 (Borovecki, Tozzo, Cerri, & Caenazzo, 2018, pp.101-105). It has been estimated that approximately 20 births were given using the cryopreserved oocytes in England since 2000 (Hodes-Wertz et al., 2013, pp.1343-1349). Oocyte cryopreservation that has increasingly become popular around the world in recent years is a procedure used to postpone pregnancy for social reasons and consists of freezing the oocytes with the chemical substances called cryoprotectant and storing them in liquid nitrogen at -196 oC for future use (De Groot et al., 2016, pp.1396-1401). This procedure has introduced the possibility of preserving fertility by freezing the oocyte by means of chemicals called cryoprotectants (Wennberg et al., 2016, pp.38-44). Although many years have passed since the live births from frozen oocytes, the long-term cryopreservation of oocytes is difficult. In addition, slow freezing, and especially the introduction of vitrification have increased the survival rates of oocytes after thawing (Hodes-Wertz et al., 2013, pp.1343-1349). With the Regulation on Assisted Reproductive Treatment Practices and Assisted Reproductive Treatment Centers in Turkey since September 30, 2014, egg freezing can be performed if the condition of women with before treatment and surgery that will damage gonad cells, low ovarian reserve and a family history of early menopause is documented with a medical board report consisting of three specialist doctors (Resmi Gazete, 2014).

Oocyte cryopreservation was initially accepted to eliminate the ethical concerns of women about embryo cryopreservation, and as an option to preserve fertility against chemotherapy or other cancer treatments (Mintziori, Veneti, Kolibianakis, Grimbizis, & Goulis, 2019, pp.1-4). Afterwards, it offered women who are not yet ready to become mother with the option of preservation their fertility for a period as much they wanted, which gives them a chance to become pregnant at older ages (Baldwin, Culley, Hudson, Mitchell, & Lavery, 2015,

pp. 239-245). This way of treatment, which is increasingly becoming common in western societies, has been viewed favorably by women who have career plans after 30 years of age, have cancer and do not have a suitable partner not only for fertility but also for prenatal and neonatal morbidity (Lallemant, Vassard, Nyboe Andersen, Schmidt, & Macklon, 2016, pp.1402-1410). However, social oocyte cryopreservation is associated with some psychological, financial and physical risks (Kanters et al., 2022, pp.1-8).

Oocyte cryopreservation and ovarian tissue cryopreservation are treatment options that are further investigated and discussed (De Groot et al., 2016, pp.1396-1401). In clinical practice the most suitable period of time for oocyte freezing is the ages between 20 and 30 (Mesen, Mersereau, Kane, & Steiner, 2015, pp. 1551-1556). However, studies report that women in this age group do not consider or use oocyte freezing (Lemoine & Ravitsky, 2015, pp.37-38). As known, the decreased fertility potential of women over 30 years leads to stress for many women. These women initiate oocyte freezing intending to increase the chance of pregnancy after the decrease in their fertility (De Groot et al., 2016, pp.1396-1401). Some web portal companies used worldwide announced that they will provide financial support to female employees if they decide on oocyte cryopreservation, aiming to facilitate their career plans. This project has helped young women cope with the stress caused by the decrease in their ovarian reserve, while bringing about a discussion that it creates a hidden pressure to exhibit belongingness to the workplace among women (Borovecki et al., 2018, pp.101-105). In this context, it is a controversial issue to see oocyte freezing as a tool for family planning.

In the study conducted by Daniluk and Koert (2016), when women were asked why to choose social oocyte cryopreservation, they answered that they did not have a suitable partner to have children (46.5-88%), they were not ready to have children (15-52.8%) and their partners were not ready to have children (50.6%) (Daniluk, & Koert, 2016, pp. 2313-2320). In another study conducted with 1061 female and male subjects in Germany, 64% of the subjects stated that they have a positive attitude towards social oocyte cryopreservation (Die Zukunft der Familie, 2016). In 2012, the American Society for Reproductive Medicine reported that oocyte freezing ceased to be an “experimental” practice; however, there was insufficient data to recommend it to healthy women (ACOG, 2014).

There is a fine line between reproductive independency and social oocyte freezing, from an ethical point of view. Oocyte freezing is perceived as a means of postponing having children. This perception indicates that women are affected by social changes. The prolonged education periods have led to a delay in becoming parents. Many of the women face a dilemma between motherhood and economic independency. Women's opinions and priorities on this issue are still unknown (Borovecki et al., 2018, pp.101-105; Baldwin et al., 2015, pp. 239-245).

It is noteworthy that the studies of oocyte cryopreservation investigated the reasons for social/medical preference, but most of them were conducted in developed societies with high socioeconomic levels (Wennberg et al., 2016, pp.38-44; Daniluk, & Koert, 2016, pp. 2313-2320; Meissner, Schippert, & Von Versen-Höynck, 2016, pp.719-729; Stoop et al., 2015,

pp.338-344). This issue was evaluated by the studies conducted on primarily medical students (Yu, Peterson, Inhorn, Boehm, & Patrizio, 2016, pp.403-411), healthcare students (Tan, Tan, Lau, Tan, & Nadarajah, 2014, pp. 1345-1352) and undergraduate students (Meissner et al., 2016, pp.719-729), as well as other studies on the communities around the world (Hodes-Wertz et al., 2013, pp.1343-1349; Wennberg et al., 2016, pp.38-44; De Groot et al., 2016, pp.1396-1401; Baldwin et al., 2015, pp. 239-245; Lallemant et al., 2016, pp.1402-1410; Daniluk, & Koert, 2016, pp. 2313-2320; Meissner et al., 2016, pp.719-729; Stoop et al., 2015, pp.338-344; Birch Petersen et al., 2017, pp. 575-581; Lewis, Missmer, Farland, & Ginsburg, 2016, pp. 1183-1189). It is also notable that there has been no study conducted in Muslim majority societies yet. For this reason, this study aimed to investigate attitudes towards oocyte cryopreservation among nursing and midwifery students, who constitute a sample from Turkish society as future healthcare professionals.

2. METHODS

2.1. Study Design

The study was designed as a cross-sectional research.

Research questions;

What is the knowledge level of students on oocyte cryopreservation?

What are the students' views on oocyte cryopreservation?

What are the students' attitudes towards oocyte cryopreservation?

When may the students consider oocyte cryopreservation?

Is there any difference in the views of nursing and midwifery students about oocyte cryopreservation?

2.2. Sample

This study was carried out with midwifery and nursing students at two universities between May 2018 and August 2018. The population of the study consisted of 1009 (550 nurses, 459 midwives) students in total. The sample was consisted of 342 students (242 midwifery, 100 nursing students), who volunteered to participate in the study between May and August 2018 without using any sample selection method. The sample size was calculated as minimum 279 students based on the formula used when the population is known and taking into account 95% confidence, 5% margin of error and estimated 50% completion rate. Totally 342 students who volunteered between the specified dates were included to the sample.

2.3. Data Collection

The data of the study were collected using 23-item online questionnaire prepared by the researchers based on literature review, which was questioning students' socio-demographic characteristics, their childbearing plans and knowledge about oocyte cryopreservation (Birch Petersen et al., 2015, pp. 2563-2574; Hodes-Wertz et al., 2013, pp.1343-1349; Lallemant et al., 2016, pp.1402-1410; Meissner et al., 2016, pp.719-729).

2.4. Statistical Analysis

Statistical analyses were performed using the SPSS version 21.0. In statistical analysis of the study data, frequency and percentage, mean, standard deviation, and minimum and maximum values were evaluated for socio-demographic characteristics, fertility awareness and knowledge of cryopreservation; while cross-table and chi-square analyzes were used for comparison between midwifery and nursing students. A p-value of <0.05 was considered to be significant for differences and correlations.

2.5. Ethical Considerations

In order to conduct the study, the approval dated 23.05.2018 with the decision number 321 was obtained from the Non-Interventional Clinical Research Ethics Committee of the related university. Verbal consent was obtained from the departments of the universities. After the participants were informed about the study, they were asked to approve the item "Do you approve of participating in this study" at the beginning of the questionnaire.

3. RESULTS

The study was conducted with 342 female students. The majority of students (70.8%; n=242) consisted of midwifery students, while 29.2% (n=100) consisted of nursing students. The majority of the group with the average age of 20.96 ± 1.8 has never worked at any job (83.9%), lives in a nuclear family (81.6%) and is single (98.2%). Other characteristics of the group are presented in Table 1.

Table 1. Demographics of Students

		n	%
Department	Midwifery	242	70.8
	Nursing	100	29.2
Grade	1	95	27.8
	2	63	18.4
	3	123	36
	4	61	17.8
Working Status	Working	55	16.1
	Non-working	287	83.9
Family Type	Extended	63	18.4
	Nuclear	279	81.6
Income Status	High	61	17.8
	Middle	263	76.9
	Low	18	5.3
Marital Status	Married	6	1.8
	Single	336	98.2
Does she have a child?	Yes	4	1.2
	No	338	98.8

58.5% of midwifery and nursing students stated that 25-29 was the range of age when women had the highest rate fertility, and they answered 37.6 on average to the question at what age the fertility of women starts to decrease. The average number of children that midwifery students wanted to have was 2.2, and it was approximately 2.1 among nursing students. Both groups stated that they intend to have a baby at the age of 26 on average. They stated that having a baby requires having a regular income and a permanent job and relationship, where no significant difference was identified between the groups ($p>0.05$). In case of low egg reserve, both midwifery and nursing students were observed to have positive attitude towards oocyte freezing (total=40.36%), having children earlier than planned (total=49.7%), considering IVF (total=39.4%) or considering adoption (total=41.81%), where no difference was identified in terms of these variables (Table 2).

Table 2. Fertility Awareness and Plans of Midwifery and Nursing Students

	Midwifery		**Nursing**		**Total**		
	n	**%**	**n**	**%**	**n**	**%**	**p**
Fertility Awareness/Plan							
What is the most fertile age range of women?							
15-19	4	1.7	2	2	6	1.8	p=0.314
20-24	88	36.4	39	39	127	37.2	
25-29	146	60.3	54	54	200	58.5	
30-34	2	0.8	4	4	6	1.7	
35-39	2	0.8	1	1	3	0.8	
	Mean	**±SD**		**Mean**	**±SD**		**p**
At what age does women's fertility begin to decline?	37.8	4.9		37.0	5.4		p=0.218
How many children are you planning to have?	2.2	0.8		2.1	1.0		p=0.320
At what age do you plan to have children?	26.3	1.6		26.8	1.8		**p=0.016**
	Midwifery		**Nursing**		**Total**		
	n	**%**	**n**	**%**	**n**	**%**	**p**
Conditions for deciding to have a child							
I must have a regular income							
Positive	219	90.5	87	87	306	89.4	p=0.552
Negative	7	2.9	5	5	12	3.5	
No idea	16	6.6	8	8	24	7.1	
I must complete my studies/education							
Positive	195	80.6	85	85	280	81.8	p=0.608
Negative	17	7	6	6	23	6.7	
No idea	30	12.4	9	9	39	11.5	
I must have a permanent job							
Positive	189	78.1	80	80	269	78.6	p=0.702
Negative	21	8.7	6	6	27	7.8	
No idea	32	13.2	14	14	46	13.4	
I must have a durable relationship							
Positive	209	86.4	82	82	291	85	p=0.573
Negative	12	5	6	6	18	5.4	
No idea	21	8.7	12	12	33	9.6	
In case of low ovarian reserve;							
I would like to have children earlier than I planned							
Positive	123	50.8	47	47	170	49.7	p=0.811
Negative	50	20.7	22	22	72	21	
No idea	69	28.5	31	31	100	29.2	
I would consider freezing oocytes							
Positive	100	41.3	39	39	139	40.6	**p=0.095**
Negative	37	15.3	25	25	62	18.2	
No idea	105	43.4	36	36	141	41.2	
I would like to use oocyte donation							
Positive	54	22.3	29	29	83	24.2	**p=0.004**
Negative	63	26	39	39	102	29.9	
No idea	125	51.7	32	32	157	45.9	
I would think about IVF							
Positive	98	40.5	37	37	135	39.4	**p=0.050**
Negative	40	16.5	28	28	68	19.9	
No idea	104	43	35	35	139	40.7	
I would consider adoption							
Positive	102	42.1	41	41	143	41.8	p=0.644
Negative	52	21.5	26	26	78	22.8	
No idea	88	36.4	33	33	121	35.3	
I reduce my desire to have children							
Positive	30	12.4	22	22	52	15.2	**p=0.077**
Negative	134	55.4	48	48	182	53.2	

No idea	78	32.2	30	30	108	31.6	

It was observed that the students did not have any knowledge about the facts that oocyte freezing at an early age reduces the risk of anomaly and fetal loss (total=33%), oocyte freezing is not different from standard IVF in terms of the success chance of pregnancy (total =27.1%) and unused oocytes are destroyed (total=35.6%). Students looked favorably the views that pregnancy complications will increase as the pregnancy postponed (total=61.26%), and that the pressure of motherhood on women who have a career has disappeared as the women gain the freedom to choose maternity time (total=57.6%). It was observed that the students in both groups generally were knowledgeable about oocyte cryopreservation (total=59%) and obtained such knowledge from healthcare professionals. There was no significant difference between the groups across the variables (p>0.05) (Table 3).

Table 3. Knowledge of Midwifery and Nursing Students about Cryopreservation and their Opinions on Oocyte Freezing

	Midwifery		**Nursing**		**Total**		
	n	**%**	**n**	**%**	**n**	**%**	**p**
Knowledge about Cryopreservation							
Do you know about oocyte cryopreservation?							
Yes	142	58.7	60	60	202	59	p=0.754
No	85	35.1	32	32	117	34.2	
I've never heard of	15	6.2	8	8	23	6.8	
If you know about it, who did you get the knowledge from?							
Healthcare Professional (Physician, Midwife, Nurse)	63	41.2	35	54.7	98	45.1	**p=0.056**
Media/Social Media	60	39.2	24	37.5	84	38.7	
Friends/Social Environment	30	19.6	5	7.8	35	16.2	
Your opinions on oocyte freezing							
Oocyte freezing at an early age reduces the risk of anomaly and fetal loss.							
Positive	82	33.9	31	31	113	33	p=0.822
Negative	43	17.8	17	17	60	17.6	
No idea	117	48.3	52	52	169	49.4	
Oocyte freezing does not differ from the standard IVF in terms of the success chance of pregnancy.							
Positive	61	25.2	32	32	93	27.1	p=0.422
Negative	50	20.7	20	20	70	20.5	
No idea	131	54.1	48	48	179	52.4	
There is a risk for women to postpone pregnancy to the age of 50-60.							
Positive	81	33.5	36	36	117	34.2	p=0.885
Negative	78	32.2	32	32	110	32.2	
No idea	83	34.3	32	32	115	33.6	
Postponing the pregnancy leads to the increased pregnancy complications.							
Positive	153	63.2	58	58	211	61.6	p=0.589
Negative	26	10.7	14	14	40	11.7	
No idea	63	26	28	28	91	26.7	
Oocyte freezing gives women freedom to choose the maternity time.							
Positive	143	59.1	54	54	197	57.6	p=0.192
Negative	28	11.6	19	19	47	13.7	
No idea	71	29.3	27	27	98	28.7	
The pressure of motherhood on career-building women disappears.							

Positive	133	55	51	51	184	53.8	p=0.699
Negative	47	19.4	19	19	66	19.3	
No idea	62	25.6	30	30	92	26.9	
Unused frozen oocytes should be destroyed.							
Positive	89	36.8	33	33	122	35.6	p=0.761
Negative	56	23.1	23	23	79	23.2	
No idea	97	40.1	44	44	141	41.2	

45% of midwifery and nursing students stated that they had never thought to freeze their oocytes. They said that they might rather have their oocytes frozen due to career (total=49.4%), lack of a suitable partner (total=45%), not feeling ready yet for having children (total=47.3%) and financial reasons (total=49.1%). No significant difference was observed between knowledge levels. It was seen that they might accept oocyte cryopreservation mostly for medical reasons. They stated that they would think about it if they were going to have cancer treatment affecting the reproductive cells (78.9%), they were underwent surgical intervention that would affect the ovaries (78%) and they were under the risk of going through early menopause (71.9%). There was no significant difference between the midwifery and nursing students across the variables (Table 4).

Table 4. Students' Opinions on the Cases Where Oocyte Freezing is Acceptable

	Midwifery		**Nursing**		**Total**		
	n	**%**	**n**	**%**	**n**	**%**	**p**
Would you think about freezing your oocytes in any time?							
I would consider it	13	5.4	7	7	20	5.8	p=0.768
Maybe I would consider it	91	37.6	32	32	123	35.7	
I never consider it	31	12.8	14	14	45	13.1	
I did not think about it	107	44.2	47	47	154	45	
When would you consider oocyte cryopreservation?							
If I haven't found a suitable partner to have children yet							
Positive	108	44.6	46	46	154	45	p=0.749
Negative	34	14	11	11	45	13.1	
No idea	100	41.3	43	43	143	41.9	
If I am not psychologically ready to have children							
Positive	117	48.3	45	45	162	47.3	p=0.705
Negative	35	14.5	13	13	48	14	
No idea	90	37.2	42	42	132	38.7	
If my partner is not psychologically ready to have children							
Positive	118	48.8	52	52	170	49.7	p=0.224
Negative	39	16.1	9	9	48	14	
No idea	85	35.1	39	39	124	36.3	
If I postpone having children for my career							
Positive	122	50.4	47	47	169	49.4	p=0.454
Negative	37	15.3	12	12	49	14.3	
No idea	83	34.3	41	41	124	36.3	
If I postpone having children for financial reasons							
Positive	122	50.4	46	46	168	49.1	p=0.621
Negative	32	13.2	12	12	44	12.9	
No idea	88	36.4	42	42	130	38	
I can accept oocyte cryopreservation if							

I will have cancer treatment affecting the reproductive cells							
Positive	194	80.2	76	76	270	78.9	
Negative	17	7	11	11	28	8.2	p=0.467
No idea	31	12.8	13	13	44	12.9	
I have undergone surgery that will affect the ovaries							
Positive	190	78.5	77	77	267	78	
Negative	14	5.8	9	9	23	6.7	p=0.537
No idea	38	15.7	14	14	52	15.2	
I am under the risk of early menopause							
Positive	175	72.3	71	71	246	71.9	
Negative	20	8.3	16	16	36	10.5	**p=0.058**
No idea	47	19.4	13	13	60	17.5	
I want to become a mother at an older age							
Positive	129	53.3	55	55	184	53.8	
Negative	46	19	24	24	70	20.5	p=0.345
No idea	67	27.7	21	21	88	25.7	
My partner cannot produce sperm during infertility treatment							
Positive	136	56.2	55	55	191	55.8	
Negative	42	17.4	23	23	65	19	p=0.415
No idea	64	26.4	22	22	86	25.2	
Insufficient number of oocytes obtained in infertility treatment							
Positive	149	61.6	61	61	210	61.4	
Negative	34	14	20	20	54	15.7	p=0.288
No idea	59	24.4	19	19	78	22.9	
I am going through an attachment problem in my relationship							
Positive	71	29.3	38	38	109	31.8	
Negative	82	33.9	38	38	120	35	**p=0.064**
No idea	89	36.8	24	24	113	33.2	
I want to give myself more time to find a partner							
Positive	76	31.4	41	41	117	34.2	
Negative	89	36.8	37	37	126	36.8	p=0.119
No idea	77	31.8	22	22	99	29	

4. DISCUSSION

Nursing students participating in our study stated that they wanted to have 2.1 children, and midwifery students, 2.2 children on average. Similarly, in an online study by Meissner et al. (2016) on 1144 students studying at the universities in Hannover, Germany, 37% of female students and 40% of male students stated that they wanted to have 2-3 children (Meissner et al., 2016, pp.719-729). In the study of Daşıkan and Taner with midwifery and nursing students, the average number of children they wanted to have was found to be 2.1 (Daşıkan &Taner, 2020, pp. 395-401). According to the Turkish Demography and Health Survey data of 2018, the total fertility rate was 2.3 (TDHS, 2018). The reason for that the results of our study were similar to the average of literature and social researches may be that the desired number of children decreases as the level of education increases. As women's participation in working life increases their need for support in child care, they may want to have fewer children.

In our study, when the students were asked about the conditions necessary for deciding on having children, they replied with having a regular income (89.4%), completing their education (81.8%), having a regular job, (78.6%) and a relationship (85%). Meissner et al. (2016) found in their study that the students in Germany needed to have a regular income (82.3%), complete their education (77.5%), have a regular job (72.7%) and relationship (89.5%) before deciding to become parents, regardless of gender and undergraduate degrees (Meissner et al., 2016, pp.719-729). Lallemant et al. (2016) conducted an online questionnaire study on women aged 18-68 in the general population of England and Denmark, and 20% of the participants stated that they might postpone starting a family for their careers (Lallemant et al., 2016, pp.1402-1410). Our results are consistent with the ones in the literature. All of our subjects were female students with a middle socioeconomic status. In Turkey, standing on their feet and having a regular family relationship are favored for the women in this group by their families.

The knowledge about oocyte cryopreservation of the participants in our study was 59% midwifery and nursing students. The students having knowledge stated that they gained this knowledge from healthcare professionals, media/social media, and friends/social environment. In the study of Daşıkan and Taner, 46.9% of the students stated that they learned during their university education (Daşıkan&Taner, 2020, pp. 395-401). In a study on 478 women who applied to fertility center and had made oocyte cryopreservation for non-medical reasons at least once, it was found that they gained knowledge about the social oocyte cryopreservation from their education (37%), their gynecologists (29%), media (14%), family and friends (14%) (Hodes-Wertz et al., 2013, pp.1343-1349). In an online survey with 129 Singaporean medical students, 36.4% of the students stated that they knew about social oocyte cryopreservation (Tan et al., 2014, pp. 1345-1352). In the study on German undergraduate students, 54.7% of the subjects said they knew oocyte cryopreservation, and 13.5% of them heard of the term but did not know what it meant (Meissner et al., 2016, pp.719-729). On the other hand, it has been observed that this issue is not sufficiently emphasized in the education of healthcare professionals or they do not have sufficient opportunities for experience. For example, in a study conducted on 239 obstetrics/gynecology assistants in United States, 25.1% said that they were sympathetic to oocyte cryopreservation, and 62.6% said that they were working in clinics where oocyte cryopreservation was recommended to patients, but this new technology was lacking in their education (Yu et al, 2016, pp.403-411). The results of our study are compatible with Meissner et al.'s and Daşıkan and Taner's results (Daşıkan & Taner, 2020, pp. 395-401; Meissner et al., 2016, pp.719-729). The level of knowledge of cryopreservation founded in Meissner et al.'s (2016) study in Germany and in our study may be higher than that of Tan et al. (2014) in Singapore, since oocyte cryopreservation has been discussed more in recent years (Meissner et al., 2016, pp.719-729; Tan et al., 2014, pp. 1345-1352). The results from the groups in our study may be higher because they have more acquainted with the issue than other groups as they are nursing and midwifery students.

Given whether the students participating in our study would prefer oocyte cryopreservation at any time, 5.8% of them responded "I would consider it", 36% "maybe I

would consider it", 13% "I never consider it", and 45% "I did not think about it". In a study by Birch Petersen et al. (2015) with 340 women at the age of 35-43 who were treated at the University of Copenhagen Fertility Center between 2011-2014, the percentages of the same responses were 21.8%, 23.6%, 2.4%, and 38.6% respectively (Birch Petersen et al., 2015, pp. 2563-2574). In the study of Daşıkan and Taner, 23.3% of the participants stated that they could freeze eggs for social reasons (Daşıkan&Taner, 2020, pp. 395-401). For the question "Would you or your partner consider egg/sperm freezing at some point in the future?" in the study of Hashiloni-Dolev et. al (2020) with 1010 students from Denmark and Israel, 52% of Israeli students and 22% of Danish students answered 'no'(Hashiloni-Dolev, Kaplan, Rasmussen, & Kroløkke, 2020, pp. 957-965). In the study of Tozzo et al. (2019) with 930 female students (medicine, law, healthcare professionals students) in Italy, only 19.5% of participants were in favour of social egg freezing (Tozzo, Fassina, Nespeca, Spigarolo, & Caenazzo, 2019, pp.1-14). Medical students were more open to cryopreservation. In the study of Tan et al. (2014) 70% of the Singaporean students who were knowledgeable about oocyte cryopreservation answered yes to the question about cryopreservation (Tan et al., 2014, pp. 1345-1352). The reason for the difference between our study and Tan et al.'s (2014) and Tozzo et. al's (2019) study may be the sample size and education field (Tan et al., 2014, pp. 1345-1352; Tozzo, et al., 2019, pp.1-14). Also, the reason for that our study is not consistent with Birch Petersen et al.'s (2015) study may be the age difference between the two groups (Birch Petersen et al., 2015, pp. 2563-2574). When asked about the reasons for preferring social oocyte cryopreservation in previous studies, the subjects replied as lack of suitable partners for having children (46.5-88%), not being ready to have children (15-52.8%), being the partner not ready to have children (50.6%), providing assurance against the possible infertility situations in the future (65%), gaining time until finding a partner (49%), non-flexible jobs (19-24%), career (45.7-72.1%), and overcoming the pressure of decreasing fertility as getting older (Hodes-Wertz et al., 2013, pp.1343-1349; De Groot et al., 2016, pp.1396-1401; Daniluk, & Koert, 2016, pp. 2313-2320; Stoop et al., 2015, pp. 338-344, Tan et al., 2014, pp. 1345-1352; Tozzo, et al., 2019, pp.1-14).

The students who participated in our study looked favorably on oocyte cryopreservation, as it would bring freedom to choose the time to become a mother (57.6%) and reduce pressure of motherhood on the career-building women (53,8%). It was found in the study of Tan et al. (2014) that the Singaporean students (45.7%) looked favorably on cryopreservation in order to focus on their careers (Tan et al., 2014, pp. 1345-1352). In a study by Lewis et al. (2016) which evaluated public support for elective cryopreservation in United States using online questionnaires on 1064 people in the USA, the participants (72.1%) were found to prefer oocyte freezing to postpone childbearing for the career (Lewis et al., 2016, pp. 1183-1189). Similarly, in the study conducted by De Groot et al. (2016) on 20 of 138 people in the waiting list of oocyte banking of Amsterdam Academic Medical Reproductive Health Center, it was found that the participants thought about oocyte freezing to overcome the pressure emerged as their fertility decreased with aging and to increase their chances of pregnancy (De Groot et al., 2016, pp.1396-1401). These studies emphasized career and overcoming the pressure of motherhood, being the most important factors in deciding on cryopreservation. Similarly, it will be preferable

to postpone having children with cryopreservation for career, since fertility and having multiple children are supported in Turkish culture (Erbaydar, 2016, pp. 163-174). In our study group as well as in the literature, the participants wanted to feel safe first to have children. They might have found oocyte cryopreservation favorable as it gives this chance.

Although the attitudes of the students of the midwifery and nursing departments towards oocyte cryopreservation were positive in our study, the rates of reasons for preference such as cancer affecting the reproductive cells (78.9%) and surgical intervention affecting ovaries (78%) were higher than that of social reasons such as gaining more time to find a partner (34.2%). Students' thoughts on this subject might have based on their education in the field of healthcare. In the study conducted by Lewis et al. (2016) in United States, women reported that they favored oocyte freezing and they could accept it more if they would have cancer treatment affecting their reproductive cells (89.3%) (Lewis et al., 2016, pp. 1183-1189). The study conducted by Lallement et al. (2016) through an online questionnaire with 973 participants from Denmark and UK founded that women could accept oocyte cryopreservation for medical reasons such as cancer treatment (78%), ovarian surgery (82%), and family history of early menopause (63%) (Lallemant et al., 2016, pp.1402-1410). Wennberg et al. (2016) compared the statuses in Stockholm and Switzerland through questionnaires by e-mail on 987 women and found that they preferred the method more due to medical reasons (79%) than social reasons (47%) (Wennberg et al., 2016, pp.38-44). In the study conducted by Lewis et al. (2016) the participants (89.3%) stated that they could accept it if they had cancer (Lewis et al., 2016, pp. 1183-1189). In the study of Meissner et al. (2016) in Germany, 40.9% of students stated that they could consider oocyte freezing if they had a low ovarian reserve (Meissner et al., 2016, pp.719-729). In the study of Tan et al. (2014), 46.5% of the Singaporean students stated that they could accept it if they could not find a suitable partner, and 45.7% to focus on their careers (Tan et al., 2014, pp. 1345-1352). In the study of Mahesan et al. (2019) in USA, with 74 female undergraduate students and 95 medical students, only 34% of all students stated that they would consider it for social reasons, with no significant difference between medical students and undergraduates (Mahesan et al., 2019, pp. 1-7). The data of our study is consistent with the one in the literature. Having illegitimate children is not favored by Islam. The use of social cryopreservation may not be preferred, considering that it may lead to increased number of single parents. The thought that the cryopreservation method can be used for such reasons leads people to use this method only when there is a medical reason. In Turkey, oocyte cryopreservation has been made since 2014 when a low ovarian reserve or a family history of early menopause is identified by the health committee report. In case of the death of the owner of frozen oocyte, the oocyte is destroyed upon the commission’s decision. Postponing pregnancy for education and career is also thought to result in elderly mothers and fathers who may be insufficient for baby/child care.

Limitations of the Study

The fact that the students were selected only from female healthcare departments in two universities in Istanbul is a limitation for the generalization of the study. Most of the researches

in the literature on this subject have been conducted in developed societies in Europe and the USA. This study will contribute to the literature on oocyte cryopreservation in Turkey, and in a Muslim majority community. The study may be conducted with a larger sample to cover the students of the state university having different socioeconomic situations. Qualitative studies may be recommended to further evaluate the individuals' attitudes and their reasons.

5. CONCLUSIONS

The subjects in our study stated that the necessary conditions for deciding to have children were regular income, completion of education, a regular job and relationship. They viewed oocyte cryopreservation favorably as it would make them free to choose the maternity time and reduce the pressure of motherhood on the career-building women, while the majority said that they could rather accept oocyte cryopreservation if there was a medical necessity.

The level of social knowledge about social oocyte cryopreservation should to be increased. Social oocyte cryopreservation can be an option for preserving fertility especially for patients who are not married, have no partners, or are opponents to religious/ethical concerns. The occasions when women consult healthcare personnel, such as for annual gynecological checks and family planning applications, can be turned into an opportunity to inform them about the issue.

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