Research Article

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Evaluation of knowledge and attitudes of female university students about ovarian reserve awareness and technologies for Ovarian Reserve: a cross-sectional study

Kız üniversite öğrencilerinin over rezervi farkındalığı ve buna yönelik teknolojiler hakkındaki bilgi ve tutumlarının değerlendirilmesi: kesitsel çalışma

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Abstract

Purpose: The aim of this study was to evaluate the knowledge and attitudes of female university students about ovarian reserve awareness and technologies for ovarian reserve.

Materials and methods: This study was designed as a descriptive and cross-sectional study and was conducted on 660 female university students. The data were collected by using a questionnaire form based on the literature on ovarian reserve and related technologies. The mean, standard deviation and percentage distributions of the data obtained through the WEB page and face-to-face interview technique were analysed in the SPSS programme.

Results: 86.2% of the students wanted to have children in the future and 75.8% planned to have children between the ages of 26-30. 56.7% of the students were aware of the availability of tests related to ovarian reserve and 86.6% of them demanded the development of new tests. In case of low ovarian reserve, 65.6% of the students stated that they could have children earlier, 68% could freeze their eggs, 51.2% could freeze their embryos, 73.8% could adopt a child and 84.7% could continue their work/education.

Conclusion: It is remarkable that the majority of the students did not make any attempt for ovarian reserve evaluation although they wanted to have a child. Among the reasons for this situation, besides the fact that the students are still receiving education, they have false beliefs that their ovarian reserves will be sufficient at the age when they want to have children, that a healthy lifestyle and activity protect the ovarian reserve, and that they can have children with assisted reproductive techniques even if their ovarian reserves are low. It is important to evaluate the ovarian reserves of young women at an early stage in order for them to make a more conscious career and family planning.

Keywords: Ovarian reserves, fertility, infertility, female, students.

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Öz

Amaç: Bu araştırmanın amacı, kız üniversite öğrencilerinin over rezervi farkındalığı ve buna yönelik teknolojiler hakkındaki bilgi ve tutumlarının değerlendirilmesidir.

Gereç ve yöntemler: Bu araştırma tanımlayıcı ve kesitsel tipte tasarlanmış olup,660 kız üniversite öğrencisi üzerinde yapılmıştır. Araştırmanın verileri over rezervi ve buna yönelik teknolojiler hakkında literatüre dayanarak hazırlanan bir anket formu kullanılarak toplanmıştır. WEB sayfası üzerinden ve yüz yüze görüşme tekniğiyle elde edilen verilerin aritmetik ortalama, standart sapma ve yüzde dağılımları SPSS programında analiz edilmiştir.

Bulgular: Öğrencilerin %86,2'si gelecekte çocuk sahibi olmayı istemekte ve %75,8'i ise 26-30 yaş arasında çocuk sahibi olmayı planlamaktadır. Öğrencilerin %56,7'si over rezervi ile ilgili testlerin olduğunun farkında olup, %86,6'sı ise yeni testler geliştirilmesini talep etmektedir. Öğrenciler over rezervlerinin düşük olması durumunda %65,6'sı daha erken çocuk sahibi olabileceğini, %68'si yumurtalarını dondurabileceğini, %51,2'si embriyolarını dondurabileceğini, %73,8'i evlat edinebileceğini ve %84,7'si iş/eğitimine kaldığı yerden devam edebileceğini belirtmiştir.

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Sonuç: Öğrencilerin büyük bir çoğunluğunun çocuk sahibi olmayı istemelerine rağmen over rezervi değerlendirilmesi için herhangi bir girişimde bulunmaması dikkat çekicidir. Bu durumun nedenleri arasında ise, öğrencilerin henüz eğitim alıyor olmalarının yanında, çocuk sahibi olmak istedikleri yaşlarda over rezervlerinin yeterli olacağına, sağlıklı yaşam biçimi ve aktivitenin over rezervini koruduğuna, over rezervleri düşük olsa bile yardımcı üreme teknikleri ile çocuk sahibi olabileceklerine yönelik yanlış inanışlarıdır. Genç kadınların over rezervlerinin erken dönemde değerlendirilmesi daha bilinçli kariyer ve aile planlaması yapabilmeleri açısından önemlidir.

Anahtar kelimeler: Yumurtalık rezervleri, doğurganlık, infertilite, kadın, öğrenciler.

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Introduction

As the age of the woman increases, the number of follicles (the spherical structure in the ovary in which the egg develops, which varies in size according to the stages of development, filled with fluid, with a cavity) and egg quality decrease. In the medical literature, this is referred to as a decrease in fertility, that is, a decrease in ovarian reserve (the number of eggs in the ovaries) [1-3]. This decrease may vary between women due to some biological differences. For example, when a girl is born, the follicles in her ovaries are lower than normal, and the proportion of follicles that undergo atresia (some of the follicles that are congenital in the ovary lose their function during the developmental stages) and follicles that start to grow are related to this situation [4, 5]

Primary ovarian insufficiency (POI) is a condition in which a woman stops menstruating (menstruation stops) or menstruation is less or less frequent than normal before the age of 40, the follicles in the ovaries are depleted or the follicles in the ovaries lose their function due to the increase in FSH (follicle-stimulating hormone) hormone. POI is also known as POF (prematureovarianfailure) [6]. The decrease in the number of ovaries can occur with a condition such as menstrual irregularity or without any symptoms. Primary Ovarian Failure has a significant impact on the health of the ovaries. Early diagnosis of Primary Ovarian Failure is important for women who want to have children (conceive) [7, 8].

Although the information on age-related fertility decline is quite abundant in the literature, what is currently discussed is that the decline in ovarian reserves varies and women postpone having children at the age when their fertility is at its peak [9-11]. Women may postpone their first pregnancy because they want to increase their level of education and pursue their career, they want to reach a certain maturity before having children, they cannot find the right mate, and they think that their independence will be limited [9-13].

In Türkiye, there is not enough literature evaluating women's awareness of ovarian reserve and their knowledge and attitudes about the technologies related to it. It is estimated that the future pregnancy plans of women who can use such screening technologies and have sufficient knowledge on this subject will be positively affected. This study will enable the determination of female university students' attitudes towards fertility and childbearing before they have children. It is also aimed to increase the awareness of young women about ovarian reserves and screening technologies used.

Matherials and methods

Type of research

This study was planned as descriptive and cross-sectional type.

Population and sample of the study

The population of the study consisted of undergraduate, graduate and doctoral students at Pamukkale University, aged 18 and over, who can read and understand Turkish. The sample calculation was made by the method of sample size calculation (99% confidence interval) in cases where the population was unknown and it was planned to reach at least 647 female students. Twelve female students who did not fully respond to the survey questions were

not included in the scope of the research and the research was completed with 660 female students. Unhealthy female students who could not read and understand Turkish and who had a disease in their reproductive organs that prevented childbearing were excluded from the scope of the research.

Data collection tools

The data of the study were collected by applying a questionnaire on the WEB page and face-to-face interviews. A questionnaire form consisting of 48 items prepared on the basis of the literature to evaluate the knowledge and attitudes of female university students about ovarian reserve awareness and technologies for ovarian reserve was used for data collection [14-16].

This study was approved by the Pamukkale University Non-Interventional Clinical Research Ethics Committee (dated 15.12.2015, number: 60116787-020/4280 and, meeting and numbered 21). After the ethics committee permission was obtained, institutional permissions were obtained for the implementation of the research. After each participant was informed about the purpose of the research, its implementation, and the voluntariness of participating in the research, a voluntary consent form was given to those who wanted to participate and their consent was obtained. In addition, the study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical analysis

SPSS programme was used for statistical analysis of the obtained values. Arithmetic mean, standard deviation and percentage distributions were made for descriptive data.

Results

The mean age of 660 female university students was 21.23±8.17 years. 96.1% of the students have undergraduate education and 48.8% of them want to have postgraduate education. 86.2% of the students want to have children in the future and 75.8% of them plan to have children between the ages of 26-30. The mothers of 26.1% of the students entered menopause at the age of 40-49 years. Socio-demographic characteristics of female students are presented in Table 1.

The opinions of the students about the use of medical technologies developed to evaluate the current status of ovarian reserves are given in Table 2. 56.7% of the students were aware of the existence of tests related to ovarian reserve and 86.6% of them demanded the development of new tests. Only 2% of the students had tests for ovarian reserve evaluation (Table 2).

89.8% of the students would like to obtain information about their ovarian reserve in general, 79.1% immediately, 90.5% in five years and 88.2% in 10 years. 90.2% of the students think that the number of eggs is “something that should be known”. 80% of the students stated that they would pay for infertility tests in the future even if they were not covered by insurance (Table 2).

The responses of the students to the questions asked based on the assumption of low ovarian reserves are given in Table 3. In case of low ovarian reserves, 45.2% of the students could get married earlier, 65.6% could have children earlier, 68% could freeze their eggs, 51.2% could freeze their embryos, 34. 4% could benefit from egg donation, 73.8% could adopt, 7.7% could leave their current job/education, 18.2% could postpone their job/education, 84.7% could continue their job/education (Table 3).

The correct answers given by the students to the questions about reproductive health are presented in Table 4. Only 14.5% of the students stated that “The ability of women to have children begins to decrease in the 30-34 age group”. A significant majority of the students (74.4%) stated that women’s reproductive ability decreases in the 35-39 age group. 54.4% of the students stated that “when a girl is born, she is born with the number of eggs she will have all her life”, 89.8% stated that “smoking can reduce the number of eggs in a woman”, 97.1% stated that “the number of eggs in the ovaries of women can vary even if they are at the same age”, 84. 5% correctly answered the statement “a woman who will undergo cancer treatment may decide to freeze her eggs before treatment”, 86.7% correctly answered the statement “women with a family history of early menopause (menstrual cessation) may enter early menopause” (Table 4).

Table 1. Socio-demographic characteristics of female students (n:660)

Variable	mean±SD
Age* (min.-max.=18-30)	21.23±8.17
Marital Status	**n (%)**
Married	10 (1.5)
Single	650 (98.5)
Section	
Economics	283 (42.9)
Nursing	227 (34.3)
Education Sciences	56 (8.5)
Architecture	44 (6.7)
Engineering	38 (5.8)
Faculty of Medicine	12 (1.8)
Current level of education	
Associate degree	10 (1.5)
Undergraduate	634 (96.1)
Master's degree	11 (1.7)
PhD	5 (0.8)
Expectations about educational career	
I want to stay as an associate degree graduate	10 (1.5)
I want to stay as a bachelor's graduate	243 (36.8)
I want to do a master's degree	322 (48.8)
I want to do a PhD	19 (2.9)
I want to continue my academic career after my PhD	66 (10)
Childbearing status	
Yes	3 (0.5)
No	657 (99.5)
Desire to have children	
I want to	569 (86.2)
I don't want to	28 (4.2)
I don't know	63 (9.6)
Age at which she plans to have a child	
18-25 years old	65 (9.8)
26-30 years old	500 (75.8)
31-35 years old	92 (13.9)
36-40 years old	2 (0.3)
41-45 years	-
46-50 years old	1 (0.2)
Age at menopause of their mother	
<40	27 (4.1)
40-49	172 (26.1)
≥50	91 (13.7)
I don't know	353 (53.5)
Not yet menopausal	17 (2.6)

Data are expressed as n (%), * Means ± standard deviations are given

Table 2. Opinions of female students about ovarian reserves (n:660)

Opinions				
Awareness of tests for ovarian reserve				374 (56.7)
Having tests for ovarian reserve assessment				13 (2.0)
Requesting the development of new tests for ovarian reserve evaluation				585 (86.6)
	Strongly Agree	**I agree**	**Disagree**	**Absolutely Disagree**
I would like to know more about the number of eggs in general	276 (41.8)	317 (48.0)	58 (8.8)	9 (1.4)
I would like to know more about my egg count immediately	194 (29.4)	328 (49.7)	120 (18.2)	18 (2.7)
I would like to know more about my egg count in the next 5 years	283 (42.9)	314 (47.6)	52 (7.9)	11 (1.6)
I would like to know more about my egg count in the next 10 years	284 (43.0)	298 (45.2)	64 (9.7)	14 (2.1)
I feel like the number of eggs is something to know	302 (45.8)	293 (44.4)	57 (8.6)	8 (1.2)
I will pay for infertility tests in the future, even if they are not covered by insurance	243 (36.8)	285 (43.2)	94 (14.2)	38 (5.8)

Data were analysed as n (%)

Table 3. Predictions of female students about what they could do in case of low ovarian reserves (n:660)

Predictions	**Strongly Agree**	**I agree**	**Disagree**	**Absolutely Disagree**
I'd have got married earlier	91 (13.8)	207 (31.4)	290 (43.9)	72 (10.9)
I would have had children earlier	145 (22.0)	288 (43.6)	184 (27.9)	43 (6.5)
I would freeze eggs	132 (20.0)	317 (48.0)	161 (24.4)	50 (7.6)
I would freeze embryos	92 (13.9)	246 (37.3)	241 (36.5)	81 (12.3)
I would use egg donation	51 (7.7)	176 (26.7)	303 (45.9)	130 (20.7)
Adopt a child	166 (25.2)	321 (48.6)	138 (20.9)	35 (5.3)
I would give up my current job / education	19 (2.9)	32 (4.8)	276 (41.8)	333 (50.5)
I would postpone my work/training	23 (3.5)	97 (14.7)	261 (39.5)	281 (42.3)
I would continue my work/education related life from where I left off	257 (38.9)	302 (45.8)	74 (11.2)	27 (4.1)

Data were analysed as n (%)

Table 4. Female students' answers to questions on reproductive health (n:660)

Questions	Answers	Number of correct answers (%)
Multiple choice		
At what age women's ability to have children begins to decline	30-34 age	96 (14.5)
That's right / Wrong		
When a girl is born, she is born with the number of eggs she will have all her life	That's right	359 (54.4)
Smoking can reduce a woman's egg count	That's right	593 (89.8)
Women who take the contraceptive pill maintain a healthy egg count	Wrong	388 (58.8)
Regular menstruation while taking the contraceptive pill is an indication of a healthy egg count	Wrong	274 (41.5)
IVF treatment enables even women with a very low egg count to conceive	Wrong	111 (16.8)
Even at the same age, the number of eggs in the ovaries of women can vary	That's right	641 (97.1)
Exercise and a healthy diet help women to maintain the number of eggs	Wrong	43 (6.5)
A woman who will undergo cancer treatment may decide to freeze her eggs before treatment	That's right	558 (84.5)
Women with a family history of early menopause (menstrual cessation) may enter early menopause	That's right	572 (86.7)

Data were analysed as n (%)

58.8% of the students evaluated the statement "the number of eggs of women taking birth control pills is preserved in a healthy way", 41.5% of the students evaluated the statement "regular menstruation while taking birth control pills is an indicator of a healthy number of eggs", 16.8% of the students evaluated the statement "in vitro fertilisation treatment enables even women with a very low number of eggs to become pregnant" and only 6.5% of the students evaluated the statement "exercise and a healthy diet enable women to preserve the number of eggs" as incorrect (Table 4).

Discussion

In this study, although 56.7% of the students were aware of the technologies (tests) developed to assess the current status of ovarian reserves, only 2% stated that they had the relevant tests. 86.6% of the students were interested in the development of new tests to assess the current status of ovarian reserves. A significant majority of the students (90.2%) think that the number of eggs is "something that should be known". Students mostly plan to have children between the ages of 26-30 (75.8%). In other words, although they wanted not to have children in an average of 5-10 years, they did not make any attempt for ovarian reserve evaluation. In general, 89.8%, 79.1%, 90.5%, 90.5% and 88.2% of the students wanted to obtain information about their ovarian reserves immediately, within five years and within 10 years, respectively. In a study conducted by Bavan et al. [14] (2011) on the attitudes of university students towards ovarian reserve technologies, 79% of the participants stated that they were interested in technologies for the evaluation of ovarian reserve, but the rate of those who wanted their ovarian reserves to be evaluated now decreased to 43%, and 70% of the participants wanted to know the status of their ovarian reserves within the first five years and 87% within the first 10 years. In line with these results, the fact that the mean age of the students was 21.23±8.17 years, that they had undergraduate education (96.1%), planned postgraduate education (61.7%), were aware of the tests and wanted to have children (86.2%) may be an indication that they did not attempt to evaluate their ovarian reserves.

In this study, the attitudes of the students in case of decreased ovarian reserves were also evaluated. The responses of the students to the questions asked based on the assumption of low ovarian reserves focused on the options of becoming a younger mother, getting married at an earlier age, egg freezing, embryo freezing and adoption. However, it was concluded that although being fertile is very important for these young women, it is not more important than their work/education life. In the study conducted by Bavan et al. [14] (2011), it was found that two-thirds of young women did not want to interfere with their work/education careers in order to have a child. In the same study, it was found striking that women were open to using assisted reproductive technologies despite this behaviour. In our study, the fact that young women mostly stated that they would pay for infertility tests in the future even if they were not covered by insurance supports this finding.

In line with the answers given by university students regarding reproductive health, it was determined that they lacked knowledge on this subject. For example, 14.5% of them answered correctly that women's ability to have children starts to decrease between the ages of 30-34. In a study conducted similar to this result, it was stated that one third of young women answered this question correctly [14]. Another study shows that although there are many reasons to postpone parenthood, female university students lack knowledge about the decline in fertility with age [17]. In line with the findings of this study, it is important that young women, especially in this age group, need education on fertility and reproductive health and that the gap in this area should be closed by health professionals.

Another important finding regarding reproductive health is that 83.2% of the students think that it is possible to have a child with in vitrofertilisation (IVF) despite decreased ovarian reserve. Similar results were found in a previous study [14]. In order to prevent this important misconception, it is inevitable that young women should be educated about assisted reproductive technologies. In addition, 93.5% of the students in this study believed that it was possible to protect the ovarian reserve of women with exercise and healthy nutrition. Similarly, in the study conducted by Bavan et al. [14] (2011), approximately three-quarters of the women who completed the questionnaire thought that exercise paired with a healthy diet could protect ovarian reserve. Due to all these lack of information, it is surprising for women who have had good health in the past and who do not have any medical problems or symptoms to be diagnosed with infertility when they want to have children [14, 18]. It is seen that the average age at which women give their first birth increases with increasing education level. It is important to detect the decline in ovarian reserves of women in the early period so that they can make more conscious career and family planning.

In conclusion; in this study, as a result of taking the opinions of young university women about ovarian reserve, deficiencies related to this subject were revealed. Especially young women should have an awareness for early evaluation of ovarian reserves. It has been reported that providing fertility information at an early age, such as during college, can help correct common misconceptions about fertility and support realistic family formation planning without negatively affecting educational and career goals (18). Based on the results of this study, it was revealed that health professionals should organise awareness trainings on ovarian reserve and fertility awareness for young women.

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References

1. Hu M, Schultz RM, Namekawa SH. Epigenetic programming in the ovarian reserve. *Bioessays*. 2023;45(10):e2300069. doi:10.1002/bies.202300069

2. Coccia ME, Rizzello F. Ovarian reserve. *Ann N Y Acad Sci*. 2008;1127:27-30. doi:10.1196/annals.1434.011

3. Alviggi C, Humaidan P, Howles CM, Tredway D, Hillier SG. Biological versus chronological ovarian age: implications for assisted reproductive technology. *Reprod Biol Endocrinol*. 2009;7:101. Published 2009 Sep 22. doi:10.1186/1477-7827-7-101

4. Committee on Gynecologic Practice of American College of Obstetricians and Gynecologists; Practice Committee of American Society for Reproductive Medicine. Age-related fertility decline: a committee opinion. *Fertil Steril*. 2008;90(3):486-487. doi:10.1016/j.fertnstert.2008.08.006

5. Iwase A, Hasegawa Y, Tsukui Y, et al. Anti-Müllerian hormone beyond an ovarian reserve marker: the relationship with the physiology and pathology in the life-long follicle development. *Front Endocrinol (Lausanne)*. 2023;14:1273966. Published 2023 Nov 3. doi:10.3389/fendo.2023.1273966

6. Sopiarz N, Sparzak PB. Primary Ovarian Insufficiency. In: StatPearls. Treasure Island (FL): StatPearls Publishing; March 6, 2023.

7. Verrilli L. Primary Ovarian Insufficiency and Ovarian Aging. *Obstet Gynecol Clin North Am*. 2023;50(4):653-661. doi:10.1016/j.ogc.2023.08.004

8. Davis M, Ventura JL, Wieners M, et al. The psychosocial transition associated with spontaneous 46,XX primary ovarian insufficiency: illness uncertainty, stigma, goal flexibility, and purpose in life as factors in emotional health. *Fertil Steril*. 2010;93(7):2321-2329. doi:10.1016/j.fertnstert.2008.12.122

9. Owen A, Carlson K, Sparzak PB. Age-Related Fertility Decline. In: StatPearls. Treasure Island (FL): StatPearls Publishing; February 2, 2024.

10. Benzies K, Tough S, Tofflemire K, Frick C, Faber A, Newburn-Cook C. Factors influencing women's decisions about timing of motherhood. *J Obstet Gynecol Neonatal Nurs*. 2006;35(5):625-633. doi:10.1111/j.1552-6909.2006.00079.x

11. Proudfoot S, Wellings K, Glasier A. Analysis why nulliparous women over age 33 wish to use contraception. *Contraception*. 2009;79(2):98-104. doi:10.1016/j.contraception.2008.09.005

12. Olafsdottir HS, Wikland M, Möller A. Reasoning about timing of wanting a child: a qualitative study of Nordic couples from fertility clinics. *J Reprod Infant Psychol*. 2011;29:493-505. doi:10.1080/02646838.2011.635298

13. Cooke A, Mills TA, Lavender T. Advanced maternal age: delayed childbearing is rarely a conscious choice a qualitative study of women's views and experiences. *Int J Nurs Stud.* 2012;49(1):30-39. doi:10.1016/j.ijnurstu.2011.07.013

14. Bavan B, Porzig E, Baker VL. An assessment of female university students' attitudes toward screening technologies for ovarian reserve. *Fertil Steril*. 2011;96(5):1195-1199. doi:10.1016/j.fertnstert.2011.08.018

15. Hashiloni Dolev Y, Shkedi S. On new reproductive technologies and family ethics: pre-implantation genetic diagnosis for sibling donor in Israel and Germany. *Soc Sci Med*. 2007;65(10):2081-2092. doi:10.1016/j.socscimed.2007.06.016

16. Nouri K, Huber D, Walch K, et al. Fertility awareness among medical and non-medical students: a case-control study. *Reprod Biol Endocrinol*. 2014;12:94. Published 2014 Sep 26. doi:10.1186/1477-7827-12-94

17. Bretherick KL, Fairbrother N, Avila L, Harbord SH, Robinson WP. Fertility and aging: do reproductive-aged Canadian women know what they need to know?. *Fertil Steril*. 2010;93(7):2162-2168. doi:10.1016/j.fertnstert.2009.01.064

18. Tan PL, Pan J, Xia X. Does information on age-related fertility decline and fertility policies affect university students' family and career expectations? Evidence from a randomized controlled trial. *PLoS One*. 2023;18(11):e0287526. Published 2023 Nov 1. doi:10.1371/journal.pone.0287526