STUDY OF THE ONCOLOGICAL PROCESS INFLUENCE ON OVARIAN RESERVE

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ABSTRACT

Relevance: The problem of reproductive health of women suffering from oncological diseases is becoming increasingly important in the context of modern healthcare. Breast cancer is increasingly diagnosed in young women of reproductive age, which creates a need to study the impact of these diseases on the ovarian reserve, which is critical for the ability to conceive.

This study aims to assess the impact of breast cancer on the ovarian reserve of women of reproductive age, as well as to develop strategies for preserving fertility.

Methods: The study involved 80 patients with oncological diseases and 61 conditionally healthy women in the Control Group. The ovarian reserve was assessed by ultrasound examination with antral follicle counting and hormonal status analysis (FSH, LH, AMH).

Results: The average number of antral follicles in the main group was lower (Me=6) compared to the Control Group (Me=9), which was statistically significant (p<0.001). FSH and AMH levels also showed sig-nificant differences between the groups, confirming the negative impact of cancer on the ovarian reserve. The LH level, however, remained stable in both groups (p=0.661).

Conclusions: The study showed that cancer significantly impacts the ovarian reserve, reducing women's reproductive capabilities. These data highlight the need to integrate fertility preservation strategies, including oocyte cryopreservation, into treatment programs. An interdisciplinary approach that combines the efforts of oncologists and reproductive specialists is important to achieve better clinical and personal outcomes for patients. Further research will help to deepen the understanding of the mechanisms affecting the ovarian re-serve in the context of cancer.

Keywords: breast cancer, ovarian reserve, hormonal status, fertility preservation, reproductive health.

Introduction: The problem of reproductive health of women suffering from oncological diseases is becoming increasingly important in the context of modern healthcare [1]. Breast cancer is increasingly diagnosed in young women of reproductive age, which creates a need to study the impact of these diseases on the ovarian reserve, which is critical for the ability to conceive [2, 3]. Modern treatment methods such as chemotherapy and radiotherapy often cause a decrease in ovarian reserve, thereby jeopardizing the possibility of future pregnancy [4-8]. Studying the relationship between cancer and changes in ovarian reserve allows us to develop more accurate strategies for preserving fertility, which is important for improving patients' quality of life [9, 10].

This study aims to assess the impact of breast cancer on the ovarian reserve of women of reproductive age, as well as to develop strategies for preserving fertility.

Materials and Methods: The study involved 80 patients aged 18 to 45 with breast cancer who were diagnosed and treated at the Tashkent city branch of the Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology (Tashkent, Uzbekistan). The Control Group included 61 conditionally healthy women of relevant ages. The ovarian reserve was assessed by ultrasound examination with antral follicle counting and hormonal status analysis (FSH, LH, AMH) before treatment. Laboratory studies were conducted in the private clinic "Mediopharm ECO" (Tashkent, Uzbekistan).

Table 1 provides descriptive statistics for categorical variables obtained in the study. Several key points regarding the distribution of participants across groups and tumor types will be emphasized.

The main study group consisted of 80 participants, which corresponds to 56.3% of the total number of those examined. The Control Group, which included 61 conditionally healthy patients, accounted for 43.7%. The study observations were characterized by an equal distribution between the group with breast cancer and the Control Group regarding representativeness.

This distribution suggests that the study is representative enough to allow comparison of data between patients with cancer and conditionally healthy participants. The categorical variables studied highlight the importance of understanding not only quantitative indicators but also qualitative characteristics of patients, which may have a significant impact on further analysis of ovarian reserve and hormonal status in the context of a particular disease.

Modern statistical methods were used to process and analyze the data. Descriptive statistics were presented as frequencies, percentages, and confidence intervals (95% CI). Groups were compared using the Mann-Whitney test for independent samples, where p-values less than 0.05 were considered statistically significant. All calculations were performed using statistical analysis software.

Table 1 – Descriptive statistics of the study's categorical variables

Indicators	Categories	Values		
		Abs.	%	95% CI
Research Group	Main Group	80	56.3	47.8-64.6
	Control Group	61	43.7	35.4-52.2
Tumor type	Breast Cancer	80	56.7	48.1-65.0
	Norm	61	43.3	35.0-51.9
Cancer Stage	I	22	15.6	10.0-22.7
	II	29	20.6	14.2-28.2
	III	20	14.2	8.9-21.1
	IV	9	6.4	3.0-11.8
	N	61	43.3	35.0-51.9

Results: According to Table 2, the mean age of the participants was 31 years, with a range of 18 to 45 years. The number of antral follicles ranged from 1 to 15; the median value was 6, and the interquartile range (IQR) was 4 to 9.

Table 2 – Analysis of the ovarian reserve indicator depending on the tumor type

Indicators	Categories	Tumor Type			p-value
		Me	Q_1-Q_3	n	
Antral follicle count	BC	6.00	3.00-8.00	80	<0.001*
	norm	9.00	5.00-11.00	61	
Follicule-Stimulating Hormone (mIU/ml)	BC	6.75	5.70-15.03	80	<0.001*
	norm	6.40	3.80-8.40	61	
Luteinizing Hormone (mIU/ml)	BC	5.35	4.20-12.00	80	0.543
	norm	5.40	4.60-6.30	61	
Anti-Mullerian Hormone (ng/ml)	BC	2.35	0.67-3.20	80	0.030*
	norm	2.70	1.30-3.90	61	

Notes: BC – breast cancer; * – differences in indicators are statistically significant (p<0.05)

The analysis showed that the number of antral follicles in patients with breast cancer was 6.00 (IQR = 3.00-8.00) among 80 participants. In the Control Group, including women with normal ovarian reserve, a median of 9.00 (5.00-11.00) with 61 participants. Statistical analysis revealed significant differences between the groups (p < 0.001), indicating a weakening of the ovarian reserve in patients with breast cancer.

The FSH level in women with breast cancer was 6.75 mIU/ml (5.70-15.03), while in the Control Group, it was 6.40 mIU/ml (3.80-8.40). Statistically significant differences were also found (p<0.001), indicating that the presence of cancer can negatively affect the hormonal background and change the functioning of the ovaries.

For the LH indicator, the results were 5.35 mIU/ml (4.20-12.00) for the BC group and 5.40 mIU/ml (4.60-6.30) for the norm. Here, statistically significant differences were not found (p=0.543), which may indicate a stable LH level despite a malignant process.

As for AMH, the median for patients with breast cancer was 2.35 ng/ml (0.67-3.20), while for the Control Group, it was 2.70 ng/ml (1.30-3.90). In this case, statistically significant differences were also found (p=0.030), confirming the decrease in AMH levels in cancer patients and indicating possible depletion of the ovarian reserve.

We analyzed the ovarian reserve indicator depending on the cancer stage.

Significant results were obtained as part of the analysis of ovarian reserve indicators depending on the breast cancer stage, presented in Table 3. Thus, the study showed that the disease stage significantly affects various ovarian reserve parameters.

According to the number of antral follicles, it was found that in Stage I, the median was 6.00 (IQR=5.00-8.00) in 22 patients. In Stage II, this indicator was higher, at 7.00 (5.00-9.00), in 29 participants. However, in Stages III and IV the number of antral follicles decreased to 4.00 (2.00-7.00) and 4.00 (1.00-6.00) in 20 and 9 patients, respectively. These results indicate statistically significant differences between the stages (p<0.001), which indicates increasing depletion of the ovarian reserve with disease progression.

FSH showed a similar trend: at Stage I, the level was 6.60 mIU/ml (5.62-13.92), and at Stage II – 6.10 mIU/ml (5.50-10.10). However, the FSH levels at Stages III and IV increased significantly – to 13.35 mIU/ml (6.30-15.93) and 13.50 mIU/ml (6.40-18.00), respectively. These results also demonstrated statistically significant differences (p = 0.001), indicating that FSH level increases with cancer progression, which may indicate ovarian dysfunction.

According to the LH level at Stage I, the median was 5.10 mIU/ml (4.17-7.83) and Stage II – 4.80 mIU/ml (4.10-5.80). At Stages III and IV, the LH level increased to

11.00 mIU/ml (5.30-13.70) and 9.00 mIU/ml (5.10-12.50), respectively, which also confirmed the statistical significance of the differences (p=0.015). An increase in LH levels with disease progression may reflect the body's adaptation mechanisms to changes in ovarian function.

Table 3 – Analysis of the ovarian reserve indicator depending on the cancer stage

Indicators	Cancer stage	stage			p
		Me	Q_1-Q_3	N	
Antral follicle count	I	6.00	5.00-8.00	22	<0.001* pN-I=0.020pN-III<0.001pN-IV=0.004
	II	7.00	5.00-9.00	29	
	III	4.00	2.00-7.00	20	
	IV	4.00	1.00-6.00	9	
	N	9.00	5.00-11.00	61	
Follicule-Stimulating Hormone (mIU/ml)	I	6.60	5.62-13.92	22	0.001* pN-III=0.005pN-IV=0.041
	II	6.10	5.50-10.10	29	
	III	13.35	6.30-15.93	20	
	IV	13.50	6.40-18.00	9	
	N	6.40	3.80-8.40	61	
Luteinizing Hormone (mIU/ml)	I	5.10	4.17-7.83	22	0.015* pIII-II=0.021
	II	4.80	4.10-5.80	29	
	III	11.00	5.30-13.70	20	
	IV	9.00	5.10-12.50	9	
	N	5.40	4.60-6.30	61	
Anti-Mullerian Hormone (ng/ml)	I	2.40	0.93-3.35	22	0.024*
	II	3.00	1.80-3.30	29	
	III	0.90	0.50-2.82	20	
	IV	0.90	0.40-2.60	9	
	N	2.70	1.30-3.90	61	

Notes: * – differences in indicators are statistically significant (p<0.05)

As for AMH, its levels were 2.40 ng/ml (0.93-3.35) at Stage I and 3.00 ng/ml (1.80-3.30) at Stage II and decreased to 0.90 ng/ml (0.50-2.82) and 0.90 ng/ml (0.40-2.60) at Stage III and IV, respectively. These results also showed statistically significant differences (p=0.024), confirming that AMH levels significantly decrease at late stages of the disease, indicating depletion of ovarian reserve.

Thus, the data show that breast cancer progression negatively affects all the studied parameters of ovarian reserve. A decrease in the number of antral follicles and AMH levels, as well as an increase in FSH and LH levels at later stages of the disease, emphasize the need for special attention to the state of reproductive function in women with cancer. These results may be useful for clinical monitoring and treatment planning, as well as for discussing fertility issues with patients.

Discussion: The study results revealed a negative impact of oncological diseases on the ovarian reserve. A significant decrease in the number of antral follicles in the participants of the main group, compared with the Control Group, indicates possible damage to the ovarian tissue due to either the disease itself or aggressive treatment. This was reflected most of all in the indicators of the number of antral follicles and the levels of FSH and AMH hormones. The FSH level was significantly higher in patients with oncological diseases, which may indicate insufficient ovarian function and compensatory mechanisms of the body to stimulate follicular growth.

The observed differences in AMH levels also confirm the deterioration of the ovarian reserve since this Hormone correlates with the number of antral follicles and is considered an important biomarker of reproductive health. Interestingly, the LH level remained stable, which may indicate a selective lesion of the follicle-stimulating system in the ovaries without affecting the hypothalamic-pituitary mechanisms regulating LH production.

Conclusion: The impact of cancer on ovarian reserve significantly limits women's future reproductive options. These findings are important for the development of fertility programs that may include oocyte cryopreservation prior to aggressive treatment or the use of ovarian protection methods during therapy. The study highlights the need for a multidisciplinary approach in treatment planning, with oncologists, reproductive specialists, and psychologists working together to ensure patients' best clinical and personal outcomes.

Thus, the analysis shows that oncological diseases significantly affect ovarian reserve indicators such as the number of antral follicles, FSH, and AMH levels. It is important to take these differences into account when planning treatment and maintaining reproductive func-

tion in women who have breast cancer. It is also necessary to continue research to understand the mechanisms affecting ovarian reserve and hormonal status in women with oncological diseases.

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АҢДАТПА

ОНКОЛОГИЯЛЫҚ ПРОЦЕСТІҢ АНАЛЫҚ СҮТ БЕЗ ҚОРЫНА ӘСЕРІН ЗЕРТТЕУ

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Өзектілігі: *Онкологиялық аурулардан зардап шегетін әйелдердің репродуктивті денсаулығы мәселесі заманауи денсаулық сақтау тұрғысынан айтарлықтай өсуде. Сүт безі қатерлі ісігі репродуктивті жастағы жас әйелдерде жиі диагноз қойылады, бұл онкологиялық аурулардың жүктілік қабілеті үшін маңызды аналық бездердің резервіне әсерін зерттеу қажеттілігін тудырады. Сүт безі қатерлі ісігі репродуктивті жастағы жас әйелдерде диагноз қойылады, бұл қатерлі ісік ауруының аналық сүт без қорына әсерін зерттеу қажеттілігін тудырады, бұл жүктілік қабілетіне өте маңызды.*

Зерттеудің мақсаты *– репродуктивті жастағы әйелдердің аналық без қорына сүт безі қатерлі ісігінің әсерін бағалау, сондай-ақ құнарлылықты сақтау стратегияларын әзірлеу.*

Әдістері: *Зерттеуде 80 онкологиялық аурулардан зардап шегетін науқастар және бақылау тобында 61 шартты сау науқастар қатысты. Аналық сүт без қорын бағалау үшін антральды фолликулалар санын есептеу және гормоналды (ФЫГ, ЛГ, АМГ) мәртебені талдау үшін УДЗ қолданылған.*

Нәтижелері: *Негізгі топтағы антральды фолликулалардың орташа саны (МЕ=6) бақылау тобымен салыстырғанда (МЕ=9) төмен болды, бұл статистикалық маңызды болды (p<0,001). ФЫГ және АМГ деңгейлері сонымен қатар онкологиялық аурулардың аналық без қорына теріс әсерін растайтын топтар арасында айтарлықтай айырмашылықтарын көрсетті. Алайда ЛГ деңгей екі топта да тұрақты болып қалды (p=0.661).*

Қорытынды: *Зерттеу онкологиялық аурулардың аналық без қорына айтарлықтай әсер ететінін, әйелдердің репродуктивті мүмкіндіктерін төмендететінін көрсетті. Бұл мәліметтер құнарлылықты, оның ішінде ооцит криоконсервингті және емдеу бағдарламаларын қолдау үшін стратегияларды біріктіру қажеттілігін көрсетеді. Онкологтар мен репродуктологтардың күш-жігерін біріктіретін пәнаралық тәсіл науқастар үшін ең жақсы клиникалық және жеке нәтижелерге қол жеткізу үшін маңызды. Әрі қарай зерттеулер онкологиялық аурулар аясында аналық сүт без қорына әсер ететін механизмдерді түсінуді тереңдетуге көмектеседі.*

Түйінді сөздер: *сүт безі қатерлі ісігі, аналық сүт без қоры, гормоналды жағдай, құнарлылықты сақтау, репродуктивті денсаулық.*

АННОТАЦИЯ

ИЗУЧЕНИЕ ВЛИЯНИЯ ОНКОЛОГИЧЕСКОГО ПРОЦЕССА НА ОВАРИАЛЬНЫЙ РЕЗЕРВ

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Актуальность: *Проблема репродуктивного здоровья женщин, страдающих онкологическими заболеваниями, приобретает всё большую значимость в контексте современного здравоохранения. Рак молочной железы всё чаще диагностируют у молодых женщин репродуктивного возраста, что вызывает потребность в изучении влияния онкологических заболеваний на овариальный резерв, критически важный для способности к зачатию.*

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Цель исследования – оценить влияние рака молочной железы на овариальный резерв женщин репродуктивного возраста, а также разработать стратегии по сохранению фертильности.

Методы: В исследовании участвовали 80 пациенток с онкологическим заболеванием и 61 условно здоровая женщина в контрольной группе. Для оценки овариального резерва применялись УЗИ для подсчета количества антральных фолликулов и анализ гормонального статуса (ФСГ, ЛГ, АМГ).

Результаты: Среднее количество антральных фолликулов в основной группе оказалось ниже (Ме=6) по сравнению с контрольной (Ме=9), что было статистически значимо (p<0,001). Уровни ФСГ и АМГ также продемонстрировали значительные различия между группами, подтверждая негативное влияние онкологических заболеваний на овариальный резерв. Уровень ЛГ, однако, оставался стабильным в обеих группах (p=0,661).

Заключение: Исследование показало, что онкологические заболевания оказывают значительное влияние на овариальный резерв, снижая репродуктивные возможности женщин. Эти данные подчеркивают необходимость интеграции стратегий сохранения фертильности, включая криоконсервацию ооцитов, в программы лечения. Междисциплинарный подход, объединяющий усилия онкологов и репродуктологов, важен для достижения лучших клинических и личностных результатов для пациенток. Дальнейшие исследования помогут углубить понимание механизмов, влияющих на овариальный резерв на фоне онкологических заболеваний.

Ключевые слова: рак молочной железы, овариальный резерв, гормональный статус, сохранение фертильности, репродуктивное здоровье.

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