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# Assessment of the Hormonal Value of Women with Ovarian Endometrioma

F. Oripova<sup>1</sup>, B. Khamdamov<sup>2</sup>

## ABSTRACT

**Background.** Endometriosis affects approximately 10% (190 million) of women and girls of reproductive age worldwide. Access to diagnosis and timely treatment for endometriosis is important, but access to such services is limited in many countries, including low- and middle-income countries.

**Materials and methods.** The examination data of 87 patients with endometriotic ovarian cysts (ECOC) aged from 25 to 37 years (average age  $29.4 \pm 2.3$  years) were analyzed. 55 (63.2%) women with the 2nd degree (average cyst diameter  $3.9 \pm 1.2$  cm) made up the 1st group and 32 women (36.8%) with the 3rd degree of the disease (above 5.8 cm) made up the 2nd group. 20 somatically healthy women of the same age without reproductive health disorders formed the control group. The concentration of sex hormones (FSH, LH, prolactin, estradiol (on days 2-3 of the menstrual cycle) and progesterone (7 days before the start of the menstrual cycle) in peripheral blood serum was determined by enzyme-linked immunosorbent assay.

**Result.** In patients with ovarian endometrioma, an increase in the level of estradiol and prolactin was found in comparison with the control group ( $p < 0.001$ ). The presence of ovarian endometriosis in patients does not hurt the state of the ovarian reserve.

**Conclusion.** In patients with ovarian endometriosis, the biochemical parameters of the ovarian reserve do not have statistically significant differences in comparison with healthy patients.

**Keywords:** ovarian endometrioma, sex hormones

## INTRODUCTION

Before talking about endometrioma, we should remind you what ovarian cysts are. These are sacs filled with liquid or solid contents that can form outside or inside the ovaries. In most cases, they are physiological, depending on the menstrual cycle; less often they are a consequence of pathological

conditions such as endometriosis or polycystic ovary syndrome. An endometrioid cyst or endometrioma is a pathological cyst that occurs against the background of endometriosis [1].

An endometrioid cyst is filled with thick brown fluid. This fluid is mostly "old" blood coming from the endometrial tissue. Typically, endometriomas have a diam-

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eter of 2–5 cm, but sometimes they can reach 10–20 cm. They are not malignant tumours, but in rare cases (less than 1%) they give rise to malignant neoplasms. Because of their chocolate color, endometriomas are also called «chocolate cysts» [2, 3].

It is incorrect to call endometrioma exclusively an ovarian cyst (although 75% of endometriomas are associated with the ovaries). It can form on the fallopian tubes and in areas of the intestines or peritoneum. According to statistics, endometrioma occurs in 10% of the female population, and most often they occur on the left ovary.

Typical symptoms of endometrioma are cramps in the lower abdomen, dysmenorrhea, pain in the pelvic area during urination or defecation, during physical activity and body movements in general. The endometrioid cyst may rupture and then the patient experiences severe abdominal pain, fever, nausea and vomiting, vaginal bleeding, accompanied by the discharge of characteristic dark blood [4, 5].

An endometrioid cyst does not so much impair the quality of the egg as it interferes with the development of the follicle and the ovulation process. And failures in this case mean that a meeting between a mature egg and a sperm is unlikely or, on the contrary, dangerous due to the risk of ectopic pregnancy [6].

The purpose of this study was to study the level of sex hormones in women with ovarian endometrioma.

## MATERIAL AND METHODS

The examination data of 87 patients with endometriotic ovarian cysts (ECOC) aged from 25 to 37 years (average age  $29.4 \pm 2.3$  years) were analyzed. Of these, 55 (63.2%) women had the 2nd degree (average cyst diameter  $3.9 \pm 1.2$  cm), making up the 1st group and 32 women (36.8%) with the 3rd degree of the disease (above 5.8 cm) - 2nd group of patients. To determine standard values, the indicators of 20 somatically healthy women at the same age without reproductive health disorders were studied.

Determination of the concentration of sex hormones was carried out by studying the level of follicle-stimulating hormone (FSH), luteinizing hormone (LH), prolactin, estradiol (on the 2-3rd day of the menstrual cycle) and progesterone (7 days before the start of the menstrual cycle MC) in peripheral blood serum using enzyme-linked immunosorbent assay analysis.

Data were statistically processed using conventional approaches, and results are presented as sample mean (M) and standard error of the mean (m). Differences be-

tween the compared groups were calculated using Student's t-tests. The significance level was set to 0.05.

## RESULTS

Analysis of anamnestic data showed that the duration of infertility in the study groups ranged from 1 to 7 years, primary infertility was dominant. The average length of infertility experience in the groups was  $2.14 \pm 0.29$  years and  $1.71 \pm 0.36$  years. The duration of ovarian endometriosis did not exceed one year, the duration of the disease from 2 to 6 months was observed in most patients (60,9%).

According to ultrasound examination of the pelvic organs, unilateral localization of cysts was observed in 66.7% of cases, bilateral - in 33.3%. The number of antral follicles (AFF) in group 1 was 7 (5; 8.5) on the affected side, 7 follicles (3; 8.5) in the right and 8.5 (6; 10) in the left ovaries. PAF in the control group was 9 follicles (8.5; 10). According to ultrasound signs, the presence of fine suspension in the cyst cavity was observed in 64 (73.6%) patients, regardless of the size of the cyst. According to some researchers, a characteristic echographic sign of an endometrioid ovarian cyst is a double contour of the formation. According to the results of our study, this sign was noted in 14.9% of cases ( $n=13$ ), which does not contradict the results of the study [7]. When visualizing the endometrioid cyst, a dense hyperechoic capsule was located, the thickness of which was 1.7 mm (1.3; 2.5).

The functional state of the reproductive system in the study groups was assessed by considering biochemical markers of the ovarian reserve (Table 1). There were no significant changes in the level of follicle-stimulating hormone (FSH) in patients with ovarian endometriosis. The results may be associated with the small size of endometriomas.

**Table 1**  
Basal levels of pituitary and ovarian hormones in women with ovarian endometriosis before surgical treatment (M± m)

Indicators	Control group	1st group	2nd group
FSH, mIU/ml	$5,46 \pm 0,34$	$5,79 \pm 0,38$	$5,35 \pm 0,33$
LH, mIU/ml	$5,38 \pm 0,51$	$6,57 \pm 0,42$	$6,62 \pm 0,31$
Estradiol, mmol/l	$61,7 \pm 19,8$	$226 \pm 20,5^*$	$246 \pm 22,3^*$
Progesterone, mmol/l	$20,9 \pm 1,46$	$13,6 \pm 1,32^*$	$10,42 \pm 1,24^*$
Prolactin, ng/ml	$19,8 \pm 0,82$	$24,6 \pm 1,03^*$	$25,9 \pm 1,12^*$
PGE2, nmol/l	$0,51 \pm 0,18$	$1,05 \pm 0,25^*$	$1,1 \pm 0,24^*$

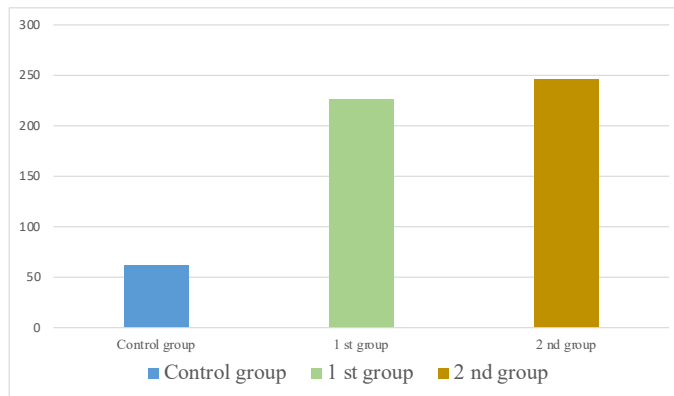
Note: \*Values are reliable in relation to the control group ( $P < 0,05 - 0,001$ )

According to the literature [8], it is shown that endometriomas measuring  $\leq 3$  cm in diameter do not hurt markers of ovarian reserve.

Our study shows a tendency to increase LH hormones in women with ovarian endometrioma compared to controls. According to R.S. Schenken et al. [10], an increase in the level of luteinizing hormone can lead to an increase in the duration of the follicular phase, anovulation - luteinization of a non-ovulating follicle and dysfunction of the luteal phase, which is described in endometriosis.

Hyperestradiolemia in patients with endometrioma was statistically significant compared to controls ( $P < 0.01$ ).

An increased level of estradiol was also found in patients of group 2 compared to the control group ( $P < 0.01$ ). The presence of hyperestradiolemia in patients with endometriosis confirms the estrogen-dependent nature of the disease and is confirmed in the works of other researchers [1], (Fig. 1).



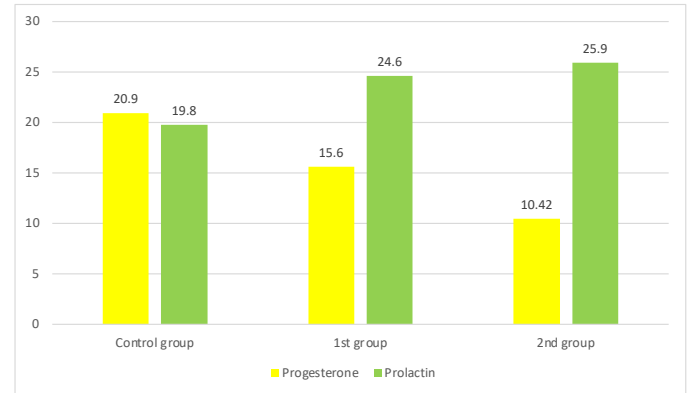
**Fig.1.** Estradiol level in examined women, nmol/l

Clinical studies show that local hyperestrogenism develops in areas of endometriosis. In other words, there is a lot of estradiol - but only where heterotopias grow.

According to some authors [8], it has been noted that against the background of endometriosis, the concentration of the aromatase enzyme in a woman's body increases, and this also leads to increased production of active estradiol. At the same time, the production of the enzyme 17 $\beta$ -estradiol type 2, which should convert estradiol into the biochemically weaker estrone, decreases. But this does not happen - and the foci of endometriosis continue to grow. It is believed that a lack of type 2 17 $\beta$ -estradiol is also associated with progesterone resistance, but this issue is still being studied [9].

Progesterone levels in patients were significantly reduced compared to the control group ( $P < 0.01$ ). The ratio of receptors to progesterone also changes in endometriosis

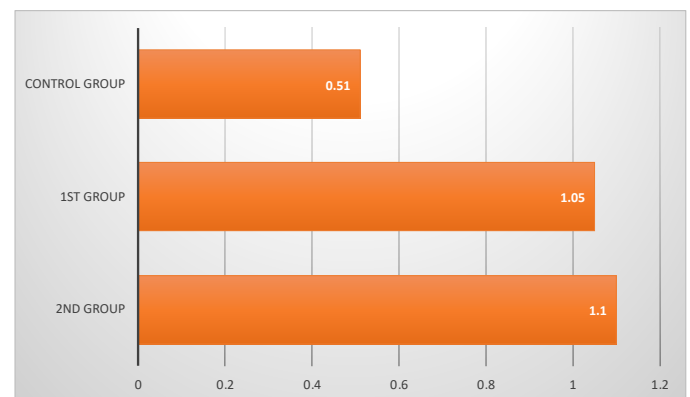
[9]. Progesterone receptors of type B are practically not detected in the lesions, while receptors of type A remain within normal limits [10]. Such changes indicate the resistance of endometriosis foci to the influence of progesterone. The progesterone level in patients of group 1 was 1.5 times lower than the values in the control group ( $P < 0.01$ ), and in women of group 2 - 2 times ( $P < 0.001$ ), (Fig. 2).



**Fig. 2.** Levels of progesterone and prolactin in women with ovarian endometriosis

Ovulation depends on prolactin. The hormone is involved in the regulation of progesterone production: its increase leads to a decrease in progesterone production and, as a result, to a slowdown in ovulation processes.

The concentration of prostaglandin E2 in endometriosis is significantly increased. As can be seen from the presented data, the level of prostaglandin E2 in women of the 1st and 2nd groups was increased by more than 2 times ( $P < 0.001$ ), (Fig. 3).



**Fig.3.** Prolactin level in the examined women, nmol/l

Increased production of estradiol contributes to an increase in the concentration of prostaglandin-E2, which is responsible for inflammation and leads to the progression of the disease.

## DISCUSSION

Thus, the functioning of the endocrine system in patients with endometriosis has a number of features. There is a monotony of production and a lack of the required amplitude of fluctuations in the levels of follicle-stimulating hormone (FSH) and luteinizing hormone in the dynamics of the menstrual cycle. This leads to desynchronization of the biorhythms of the production of sex hormones, a violation of the progesterone-estradiol ratio, when a high level of estradiol throughout the menstrual cycle was accompanied by an excess of progesterone in the level of healthy individuals in the follicular phase of the menstrual cycle [9]. That is, an imbalance of the endocrine system is manifested in endometriosis by disturbances in the rhythms of the production of gonadotropic hormones and the relationship between gonadotropins and sex hormones. There was an absence of ovulatory peaks of FSH and LH at high basal levels, a change in the ratio between progesterone and estradiol with inverse dynamics of the progesterone-estradiol ratio. All endocrine disorders were mosaic, which confirms the heterogeneity of the group of patients with endometriosis. The number, size and localization of endometrioid heterotopias, as well as the age of patients with endometriosis, did not significantly affect the nature of changes in endocrine status [10].

## CONCLUSION

In patients with ovarian endometrioma, an increase in the level of estradiol and prolactin was found in comparison with the control group ( $p < 0.001$ ). The presence of ovarian endometriosis in patients does not hurt the state of the ovarian reserve. In patients with ovarian endometriosis, the biochemical parameters of the ovarian reserve do not have statistically significant differences in comparison with healthy patients.

**Patient selection criteria** – ultrasound examination of the presence of endometriotic cysts in the ovaries

**Conflict of interest** – not declared

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## TUXUMDON ENDOMETRIOMASI BO'LGAN AYOLLARNING GORMONAL HOLATINI BA- HOLASH

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Buxoro davlat tibbiyot instituti  
ABSTRAKT

**Dolzarbliqi.** Endometrioz butun dunyo bo'ylab re-  
produktiv yoshdagi ayollar va qizlarning taxminan 10  
foizini (190 million) tashkil qiladi. Endometriozni tashx-  
islash va o'z vaqtida davolash imkoniyati juda muhim,  
biroq ko'plab mamlakatlar, jumladan, past va o'rta daro-  
madli mamlakatlarda bunday xizmatlardan foydalanish  
imkoni cheklangan.

**Material.** 25 yoshdan 37 yoshgacha bo'lgan (o'rtacha  
yoshi  $29,4 \pm 2,3$  yil) tuxumdon endometriozli kistasi  
bo'lgan 87 bemorning tekshiruv ma'lumotlari tahlil qilin-  
di. 2-darajali (o'rtacha kista diametri  $3,9 \pm 1,2$  sm) 55 na-  
far (63,2%) ayol 1-guruhni, 32 nafari (36,8%) kasallik 3-  
darajali (5,8 sm dan yuqori) 2-guruhni tashkil etdi. Na-  
zorat guruhini reproduktiv salomatlik kasalliklari bo'l-  
magan bir xil yoshdagi 20 nafar somatik sog'lom ayollar  
tashkil etdi. Periferik qon zardobida jinsiy gormonlar  
(folikulostimulovchi, lyutinlovchi, prolaktin, estradiol  
(hayz siklining 2-3-kunlarida) va progesteron (hayz sikli  
boshlanishidan 7 kun oldin) kontsentratsiyasi ferment  
bilan bog'liq immunosorbent tahlili bilan aniqlandi.

**Natijalar.** Tuxumdon endometriomasi bo'lgan bemor-  
larda nazorat guruhiga nisbatan estradiol va prolaktin  
darajasining oshishi aniqlandi ( $p < 0,001$ ). Bemorlarda  
tuxumdon endometriozining mavjudligi tuxumdonlar  
zahirasi holatiga salbiy ta'sir ko'rsatmaydi.

**Xulosa.** Tuxumdon endometriozini bilan og'rigan be-  
morlarda tuxumdon zahirasi biokimyoviy ko'rsat-  
kichlari sog'lom bemorlarga nisbatan statistik jihatdan  
sezilarli farqlarga ega emas.

**Kalit so'zlar:** tuxumdon endometriomasi, jinsiy gor-  
monlar

## ОЦЕНКА ГОРМОНАЛЬНОГО ФОНА ЖЕНЩИН С ЭНДОМЕТРИОМОЙ ЯИЧНИКА

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**Актуальность.** Эндометриозом страдает  
примерно 10% (190 млн) женщин и девочек  
репродуктивного возраста во всем мире. Важное  
значение имеет доступ к диагностике и своевре-  
менному лечению эндометриоза, однако во многих  
странах, в том числе в странах с низким или средним  
уровнем дохода, возможности для получения таких  
услуг ограничены.

**Материалы и методы.** Проанализированы данные  
обследования 87 пациенток с эндометриодными  
кистами яичников (ЭКЯ) в возрасте от 25 до 37 лет  
(средний возраст  $29,4 \pm 2,3$  лет). 55 (63,2%) женщин со  
2-ой степенью (средний диаметр кист  $3,9 \pm 1,2$  см),  
составили 1-ю группу и 32 женщины (36,8%) с 3-й  
степенью заболевания (выше 5,8 см) составили 2-я  
группа. 20 соматически здоровых женщин в том же  
возрасте без нарушения репродуктивного здоровья  
составили контрольную группу. Определяли концен-  
трацию половых гормонов (ФСГ, ЛГ, пролактина,  
эстрадиола (на 2-3 день менструального цикла) и  
прогестерона (за 7 дней до начала менструального  
цикла) в сыворотке периферической крови методом  
твердофазного иммуноферментного анализа.

**Результаты.** У пациенток с эндометриомой  
яичников установлено повышение уровня эстрадиола  
и пролактина в сравнении с группой контроля  
( $p < 0,001$ ). Наличие эндометриоза яичников у  
пациенток не оказывает негативного влияния на  
состояние овариального резерва.

**Заключение.** У больных эндометриозом  
яичников, биохимические параметры овариального  
резерва не имеют статистически значимых различий  
в сравнении со здоровыми пациентками.

**Ключевые слова:** эндометриома яичников,  
половые гормоны