DOI: https://doi.org/10.30841/2708-8731.7.2025.343878
UDC 618.14-006.36-008.81-06-07:612.621.31

Hormonal status of reproductive age women with benign proliferative diseases of the uterus

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Proliferative diseases of the uterus are the most common gynecological pathology, and the frequency of combined development of hyperplastic processes of the endo- and myometrium is 63.0–73.0%. Uterine leiomyoma, adenomyosis and benign hyperplastic processes of the endometrium are manifestations of proliferative syndrome in the organs of the female reproductive system and indicate a number of common features of the pathogenetic mechanisms of their development.
The objective: **to study the hormonal status of reproductive age women with combined and solitary proliferative diseases of the uterus.**
Materials and methods**. 210 respondents of reproductive age (19–35 years) were examined, of which 30 women were almost health (Control Group) and 180 women had hyperplastic uterine processes, including 90 patients with combined proliferative uterine processes (Main Group) and 90 women with isolated proliferative uterine processes (Comparison Group). The hormonal status was assessed by determining the levels of follicle-stimulating hormone (FSH) and luteinizing hormone (LH), estradiol, progesterone, prolactin in the blood serum, calculating the LH/FSH index and the estradiol/progesterone ratio, taking into account data of ultrasound examination of the pelvic organs. Statistical data processing was performed using the computer program Statistica 13.3.721.**
Results**. In the case of combined uterine pathology, the hormonal homeostasis system is subjected to significantly greater stress than in the case of solitary pathology, as evidenced by a decrease in the frequency of full menstrual cycles in almost every second woman. In women with isolated hyperplastic uterine processes, anovulatory cycles and luteal phase insufficiency occur with almost the same frequency, and in combined ones, the frequency of luteal phase insufficiency exceeds the frequency of anovulatory cycles by 1.3 times. Combined forms of the benign proliferative diseases of the uterus in reproductive age women are developed in 1.6 times more because of ovarian insufficiency than the solitary ones.**
Conclusions**. Hormonal insufficiency was found in almost every second reproductive age women with combined hyperplastic processes of the endo- and myometrium and in every third women with solitary uterine processes. Anovulation is observed in 21.1% of patients with combined and in 15.6% with isolated forms of uterine hyperplastic processes; luteal phase insufficiency – in 26.7% and 14.4% of patients, respectively ($p < 0.05$).**
Keywords: *uterine leiomyoma, adenomyosis, hyperplastic processes of the endometrium, solitary proliferative pathology of the uterus, menstrual cycle disorders, hormonal homeostasis.*

Гормональний статус жінок репродуктивного віку з доброякісними проліферативними захворюваннями матки

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Проліферативні захворювання матки є найбільш поширеною гінекологічною патологією, а частота поєднаного розвитку гіперпластичних процесів ендо- і міометрія становить 63,0–73,0%. Лейоміома матки, аденоміоз та доброякісні гіперпластичні процеси ендометрія є проявами проліферативного синдрому в органах репродуктивної системи жінок і вказують на низку загальних рис патогенетичних механізмів їхнього розвитку.
Мета дослідження: вивчення гормонального статусу жінок репродуктивного віку з поєднаними та солітарними проліферативними захворюваннями матки.
Матеріали та методи. Обстежено 210 респонденток репродуктивного віку (19–35 років), з яких 30 – практично здорові жінки (контрольна група), 180 – з гіперпластичними процесами матки, зокрема 90 пацієнток із поєднаними (основна група) та 90 – з ізольованими проліферативними процесами матки (група порівняння). Проведено аналіз особливостей гормонального статусу шляхом визначення в сироватці крові рівня фолікулостимулювального гормону (ФСГ) та лютеїнізувального гормону (ЛГ), естрадіолу, прогестерону, пролактину, розрахунку індексу ЛГ/ФСГ і співвідношення естрадіолу/прогестерону з урахуванням даних ультразвукового дослідження органів малого таза. Статистичну обробку даних виконано з використанням комп'ютерної програми Statistica 13.3.721.
Результати. У разі поєднаної патології матки система гормонального гомеостазу зазнає значно більшого напруження, ніж при наявності солітарної патології, про що свідчить зниження частоти повноцінних менструальних циклів майже у кожної другої жінки. У жінок з ізольованими гіперпластичними процесами матки ановуляторні цикли й недостатність лютеїнової фази відзначаються практично з однаковою частотою, тоді як при поєднаних формах частота недостатності лютеїнової фази перевищує частоту ановуляторних циклів в 1,3 раза. Поєднані форми доброякісних проліферативних захворювань матки у жінок репродуктивного віку розвиваються на тлі овариальної недостатності в 1,6 раза частіше, ніж солітарні форми.
Висновки. Гормональну недостатність яєчників виявлено майже у кожної другої жінки репродуктивного віку з поєднаними гіперпластичними процесами ендо- і міометрія та у кожної третьої – із солітарними формами проліферативних захворювань матки. Ановуляція зафіксована у 21,1% пацієнток із поєднаними формами та у 15,6% – з ізольованими формами гіперпластичних процесів матки; недостатність лютеїнової фази – у 26,7% та 14,4% хворих відповідно ($p < 0,05$).
Ключові слова: *лейоміома матки, аденоміоз, гіперпластичні процеси ендометрія, солітарна проліферативна патологія матки, порушення менструального циклу, гормональний гомеостаз.*

Uterine proliferative diseases, such as leiomyoma, adenomyosis, and benign endometrial hyperplastic processes, are the most common gynecological pathology, the incidence of which is increasing worldwide [1–5]. Uterine leiomyoma, according to modern ideas, is a monoclonal hormone-sensitive proliferate, which consists of phenotypically altered smooth muscle cells. The frequency of uterine leiomyoma is 25.0–30.0% among the female population, and according to pathological studies, the prevalence of leiomyoma reaches 85.0% [5–7]. Women with uterine leiomyoma make up more than 30.0–40.0% of patients in gynecological departments. The main reasons for the patient's admission are abnormal uterine bleeding, pelvic pain, infertility, and miscarriage associated with this pathology [7–9].

Adenomyosis is a dyshormonal immune dependent pathological process which is characterized by benign invasive growth in the muscle layer of the uterus, endometrial glands and their stroma, accompanied by hyperplasia and hypertrophy of smooth muscle tissue. Adenomyosis occupies the third place in the prevalence rank among the women's the internal genital organs diseases, taking a back seat after inflammatory processes of the pelvic organs and uterine leiomyoma [10, 11]. In addition to the significant prevalence of the disease, the relevance of the adenomyosis becomes actual due to the severity and multifaceted nature of the clinical picture. Patients with adenomyosis suffer from menstrual and reproductive function disorders and pelvic pain. These patients are subjected to numerous diagnostic, surgical and long-term drug effects, which are not always effective [12–14].

The data presented in the literature about the structure of benign proliferative endometrial pathology is quite contradictory [15, 16]. In reproductive age, simple typical endometrial hyperplasia is diagnosed in 6.0–10.0% of women, in premenopause the frequency increases to 17.0–21.0%. Endometrial polyps occur with a frequency of 5.0–25.0% [17, 18]. In the postmenopausal period, glandular endometrial hyperplasia occurs with a frequency of 3.2–28.6% in women with bloody discharge, and endometrial polyps in 21.0–81.6% [19]. It is known that the long-term existence of actively proliferating cells, regardless of the reason that caused the proliferation, facilitates the implementation of oncogenic growth [20, 21].

Currently, there is an increase in the frequency of combined development of hyperplastic processes of the endo- and myometrium, which is from 63.0 to 73.0% [22]. Uterine leiomyoma, adenomyosis and benign hyperplastic processes of the endometrium are a manifestation of proliferative syndrome in the organs of the female reproductive system and indicate a number of common hormonals, morphological, immunohistochemical features in their development [23–25]. Benign hyperplastic processes of the endometrium in 30.0–35.0% develop synchronously with uterine leiomyoma, in 15.0–25.0% with adenomyosis [2, 7, 26]. It is noted that the combined development of benign endometrial hyperplasia with uterine leiomyoma is diagnosed in 43.6% of patients, with adenomyosis – in 25.0%, and the simultaneous development of endometrial hyperplasia, uterine leiomyoma and adenomyosis – in 54.0% of patients [26–28]. In 72.0–85.0% of cases, the presence of combined hyperplastic processes of the endo- and myometrium determines the indications for hysterectomy in reproductive age women [29, 30]. Therefore, the complexity of the problem determines the importance of common features identification of pathogenetic mechanisms in the proliferative diseases development in order to optimize approaches to their prevention and treatment.

The objective: to study the hormonal status of reproductive age women with combined and solitary proliferative diseases of the uterus.

MATERIALS AND METHODS

The study was conducted at the clinical base of the Obstetrics and Gynecology No. 3 Department of the Bogomolets National Medical University (BNMU) – Maternity and Childhood Center of the Municipal Non-Profit Enterprise (MNPE) "Kyiv City Clinical Hospital No. 5" and is an integral part of the research work of the department "Substantiation of the role of modern medical and diagnostic technologies in ensuring the quality of life of women of reproductive and perimenopausal age", state registration number 0124U001136 (2024–2026 years). The study was performed in accordance to the principles of the Declaration of Helsinki and approved by the Commission on Bioethical Expertise and Ethics of Scientific Research at the BNMU (protocol No. 191 dated 01.27.2025). Informed consent for conducting research, diagnostic and therapeutic measures was obtained.

210 respondents of reproductive age were examined, of which 30 – healthy women, without any gynecological pathology of 19–35 years old (Control Group – CG) and 180 were with hyperplastic processes of the uterus. The Main Group (MG) – Group I – was formed by 90 patients with combined hyperplastic processes of the uterus: 30 with uterine leiomyoma and adenomyosis (Subgroup IA), 30 with uterine leiomyoma and endometrial hyperplastic processes (Subgroup IB), 30 with uterine leiomyoma, adenomyosis and endometrial hyperplastic processes (Subgroup IC). Comparison Group (CmpG) – Group II – included 90 women with isolated proliferative processes of the uterus: 30 with uterine leiomyoma (Subgroup IIA), 30 with adenomyosis (Subgroup IIB), 30 with hyperplastic processes of the endometrium (Subgroup IIC). The age of 17 (56.7%) CG women was 26–35 years, 13 (43.3%) – 19–25 years. The vast majority of the MG (78.9%) and the CmpG (65.6%) women were in 26–35 year category.

Including criteria to the MG and the CmpG: age 19–35 years, uterine leiomyoma of the 3–6 types (by FIGO classification – International Federation of Gynecology and Obstetrics) together with adenomyosis (by ENZIAN classification) and endometrial hyperplastic processes or with isolated forms of endo- and myometrium proliferative processes.

Excluding criteria: presence of oncological pathology or in anamnesis, acute inflammatory diseases, decompensated somatic pathology, endocrinopathy, ovarian tumors, pregnancy, lactation.

In order to assess the characteristics of hormonal status, we conducted a comprehensive examination of all patients included in the study on days 3–5 of the menstrual cycle, during which the serum concentrations of follicle-stimulating hormone (FSH), luteinizing hormone (LH),

ISSN 2708-8723 (print)
ISSN 2708-8731 (online)

and estradiol were determined, and the LH/FSH ratio was calculated. On days 20–23 of the menstrual cycle, serum levels of progesterone, estradiol, and prolactin were measured, and the estradiol/progesterone ratio was assessed. Hormone levels were determined by ELISA using standard reagent kits (FineTest, China; CUSABIO, China), on a Stat Fax 2100 analyzer (Awareness Technology, USA) in the laboratory of the Maternity and Childhood Center of the MNPE "Kyiv City Clinical Hospital No. 5" together with "Neolab", Kyiv.

In all examined women ultrasound examination of the pelvic organs were performed twice: on days 11–13 and 20–23 of the menstrual cycle on the MyLab8 ultrasound system (Esaote, Italy) using a transvaginal sensor with a frequency of 5.0 MHz. During the ultrasound, the thickness and structure of the endometrium, the size of the ovaries and signs of their functional activity (the state of the follicular apparatus, the presence of a dominant follicle and *corpus luteum*, their sizes) were analyzed and assessed. In the presence of formations in the ovaries, their assessment was carried out (size, shape, contours, echostructure).

A biphasic ovulatory cycle was confirmed if there were signs of ovulation that had occurred: visualization of a mature follicle with a diameter of 18 mm or more on days 11–13, the presence of a *corpus luteum* during examination on days 20–23 of the menstrual cycle, presence of endometrium with clear signs of secretory transformations, with a progesterone level of more than 25 nmol/L. In women with no ultrasound signs of ovulation (no follicle growth, or insufficient size – less than 18 mm), and with a progesterone level of no more than 10 nmol/L, the type of menstrual cycle was defined as anovulatory. Luteal phase insufficiency was diagnosed in the presence of ovulation that occurred and signs of insufficiency of the second phase of the menstrual cycle (progesterone level on days 20–23 of the menstrual cycle from 10 to 25 nmol/L).

Statistical data processing was carried out on a personal computer using the computer program Statistica 13.3.721 (StatSoft Inc., USA). For quantitative description, the arithmetic mean (M) and the standard error of the mean (m), presented in the format M ± m, were used. The normality of data distribution was checked using the Shapiro–Wilk test. For intergroup comparison of mean values, one-way analysis of variance (ANOVA) was used. For pairwise comparison with the CG, the Student's t-test for independent samples was used. When analyzing categorical variables, the Pearson χ^2 test was used. The difference was considered statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION

According to the data obtained by us, the average sex hormones values in the CG women were within the limits which are characteristic to the ovulatory menstrual cycle (Table 1).

The average hormone levels in patients of the MG of all Subgroups were within the normal range, however, in women of the Subgroup IC, the FSH level on days 3–5 of the menstrual cycle was 1.2 times lower. The LH level was 1.4 times lower in patients of the Subgroup IA and 1.7 times lower in women of Subgroups IB and IC, compared with the CG ($p < 0.05$). The LH/FSH index was also reduced in patients of all observation Subgroups ($p < 0.05$). Hormonal homeostasis on days 20–23 of the menstrual cycle was characterized by a decrease in progesterone levels by 1.3 times in patients of Subgroup IA ($p < 0.05$), by 1.7 times in patients of Subgroup IB and by 1.9 times in patients of Subgroup IC ($p < 0.01$), as well as an increase in estradiol levels by 1.2 times in IA and 1.1 times in IB patients and by 1.3 times in the Subgroup IC, relative to the indicator of women in the CG ($p < 0.05$). The estradiol/progesterone ratio was higher in the Subgroup IA by 1.6 times ($p < 0.05$), in the Subgroup IB by 1.8 times ($p < 0.05$) and in the Subgroup IC by 2.4 times ($p < 0.01$) than in the CG. The average prolactin level in patients with combined proliferative processes of the uterus was within the reference values and did not differ from the indicator of the CG women.

In the CmpG patients with isolated benign proliferative diseases of the uterus (Table 2), the average values of pituitary and ovarian hormones were within the reference values, but there were differences from the CG: the FSH level was 1.3 times lower in women of Subgroup IIA and 1.2 times in Subgroup IIB, and the LH level was lower in all three Subgroups – 1.4 times in Subgroups IIA and IIB and 1.7 times in IIB ($p < 0.05$).

Table 1

Results of hormonal examination of the CG and MG women M ± m (Unit)

Indicators	Subgroup IA, n = 30	Subgroup IB, n = 30	Subgroup IC, n = 30	CG, n = 30
On days 3–5 of the menstrual cycle				
FSH, mIU/mL	5.21 ± 0.47	4.96 ± 0.36	4.75 ± 0.31*	5.7 ± 0.5
LH, mIU/mL	5.47 ± 0.44*	4.59 ± 0.38*	4.56 ± 0.69*	7.8 ± 0.4
LH/FSH	1.05 ± 0.04*	0.93 ± 0.09*	0.96 ± 0.07*	1.37 ± 0.08
Estradiol, pmol/L	258.41 ± 26.11	252.81 ± 25.92	261.41 ± 25.31	212.5 ± 18.4
On days 20–23 of the menstrual cycle				
Estradiol, pmol/L	561.20 ± 50.34*	503.80 ± 54.06*	593.1 ± 46.2*	467.5 ± 31.8
Progesterone, nmol/L	35.52 ± 1.81*	27.63 ± 1.78**	24.5 ± 1.6**	47.4 ± 1.2
Estradiol/progesterone	15.8 ± 1.4*	18.3 ± 1.7**	24.2 ± 1.5**	9.9 ± 1.5
Prolactin, mIU/L	149.7 ± 15.5	146.1 ± 14.4	153.2 ± 16.7	130.1 ± 13.8

Notes: * – $p < 0.05$; ** – $p < 0.01$ when compared with the CG; FSH – follicle-stimulating hormone; LH – luteinizing hormone.

ISSN 2708-8723 (print)
ISSN 2708-8731 (online)

Table 2

Results of hormonal examination of women in the CG and the CmpG, M ± m (Unit)

Indicators	Subgroup IIA, n = 30	Subgroup IIB, n = 30	Subgroup IIC, n = 30	CG, n = 30
On days 3–5 of the menstrual cycle				
FSH, mIU/mL	4.29 ± 0.26*	5.14 ± 0.23	4.61 ± 0.22*	5.7 ± 0.5
LH, mIU/mL	5.51 ± 0.63*	5.39 ± 0.41*	4.55 ± 0.65*	7.8 ± 0.4
LH/FSH	1.28 ± 0.11	1.05 ± 0.04*	1.35 ± 0.19	1.37 ± 0.08
Estradiol, pmol/L	254.52 ± 25.63	253.15 ± 24.39	284.6 ± 27.3	212.5 ± 18.4
On days 20–23 of the menstrual cycle				
Estradiol, pmol/L	483.2 ± 31.9	499.3 ± 30.3	486.8 ± 34.7	467.5 ± 32.8
Progesterone, nmol/L	38.9 ± 1.6*	40.4 ± 1.5*	32.3 ± 1.7*	47.4 ± 1.2
Estradiol/progesterone	12.4 ± 1.3*	12.4 ± 1.4*	15.1 ± 1.4*	9.9 ± 1.5
Prolactin, mIU/L	145.3 ± 4.2	164.5 ± 4.1	156.7 ± 4.3	130.1 ± 13.8

Notes: *– p < 0.05; ** – p < 0.01 when compared with the CG; FSH – follicle-stimulating hormone; LH – luteinizing hormone.

Table 3

Comparative characteristics of the menstrual cycle of the examined patients (abs. n., %)

Cycle type / Subgroups	Subgroup IA, n = 30	Subgroup IIA, n = 30	CG, n = 30
Full cycle	22 (73.3)	25 (83.3)	28 (93.4)
Anovulatory cycle	3 (10.0)*	2 (6.7)*	1 (3.3)
Corpus luteum insufficiency	5 (16.7)**	3 (10.0)	1 (3.3)
Cycle type / Subgroups	**Subgroup IB, n = 30**	**Subgroup IIB, n = 30**	**CG, n = 30**
Full cycle	12 (40.0)*	21 (70.0)	28 (93.4)
Anovulatory cycle	9 (30.0)**	4 (13.3)*	1 (3.3)
Corpus luteum insufficiency	9 (30.0)**	5 (16.7)**	1 (3.3)
Cycle type / Subgroups	**Subgroup IC, n = 30**	**Subgroup IIC, n = 30**	**CG, n = 30**
Full cycle	13 (43.3)*	17 (56.7)*	28 (93.4)
Anovulatory cycle	7 (23.4)**	8 (26.7)**	1 (3.3)
Corpus luteum insufficiency	10 (33.3)**	5 (16.6)*	1 (3.3)

Notes: *– p < 0.05; ** – p < 0.01 when compared with the CG.

The LH/FSH index in the Subgroup IIB women was 1.3 times lower than in the CG ones (p < 0.05). The estradiol value did not differ from the CG women on days 3–5 and 20–23 of the menstrual cycle (p > 0.05), while the progesterone level in the II phase of the cycle was 1.2 times lower in women of the IIA and IIB Subgroups, and 1.5 times lower in women of the Subgroup IIC (p < 0.01). Accordingly, the estradiol/progesterone ratio was 1.3 times higher in the IIA and IIB Subgroups and 1.5 times higher in the Subgroup IIC patients (p < 0.05). The prolactin level in women with solitary proliferative processes of the uterus did not differ from the CG women and did not depend on the form of the disease.

Thus, in the case of combined uterine pathology, the hormonal homeostasis system is subjected to significantly greater stress than in the case of solitary pathology, as also evidenced by the characteristics of the menstrual cycle of the examined patients presented in Table 3, presented according to ultrasound and hormonal studies.

In 28 (93.3%) of the respondents in the CG had a full biphasic menstrual cycle. Only 1 woman (3.3%) aged 22 years was found to have an anovulatory menstrual cycle during the examination. Also, 1 woman (3.3%) aged 35 years was diagnosed with insufficiency of the *corpus luteum* function. The value of pituitary gonadotropins in these patients were within the reference range.

In women of the MG, the frequency of complete menstrual cycles was lower than in the CG. Significantly fewer complete cycles were found in the Subgroups IB (40.0%), IC (43.3%) and IIC (56.7%). Anovulatory cycles occurred in 10.0% of Subgroup IA patients, in 30.0% of IB and in 23.3% of IC ones. In the case of isolated pathology, anovulatory cycles in the Subgroup IIA occurred 1.5 times less often, in Subgroup IIB 2.3 times less often, and in Subgroup IIC at the same level as in Subgroup IC. *Corpus luteum* insufficiency occurred in 5 (16.7%) Subgroup IA patients, in 9 (30.0%) Subgroup IB and in 10 (33.3%) Subgroup IC ones. At the same time, in isolated endometrial hyperplastic processes, *corpus luteum* insufficiency occurred 1.7 times less frequently in Subgroup IIA, 1.8 times in Subgroup IIB, and 2 times in Subgroup IIC in comparison with patients who had combined uterine pathology.

ISSN 2708-8723 (print)
ISSN 2708-8731 (online)

Table 4

Frequency of anovulatory cycles and luteal phase insufficiency in patients with combined and isolated hyperplastic processes of the uterus (abs. n., %)

Indicators	MG, n = 90	CmpG, n = 90	CG, n = 30
Anovulatory cycle	19 (21.1)*	14 (15.6)*	1 (3.3)
Luteal phase insufficiency	24 (26.7)*	13 (14.4)*	1 (3.3)

Note: * – $p < 0.01$ when compared with the CG.

Comparison of the anovulatory cycles frequency in patients with combined and isolated hyperplastic processes of the uterus indicates a 1.4-fold increase in the anovulatory cycles (21.1%) in the MG patients in compared to the CmpG (15.6%), ($p < 0.05$) (Table 4). *Corpus luteum* insufficiency was detected 1.9 times more often in the MG women (26.7%) than in the CmpG (14.4%), ($p < 0.05$).

It should be noted that in patients with isolated and combined hyperplastic processes of the uterus, the frequency of anovulatory menstrual cycles and luteal phase insufficiency was significantly higher than in the CG women ($p < 0.01$).

The study showed a high frequency of ovarian failure in patients with hyperplastic processes of the uterus, which in respondents with isolated pathology was 30.0%, and in the presence of combined hyperplastic processes – 47.8%. In women with isolated hyperplastic processes of the endo- and myometrium anovulatory cycles and luteal phase insufficiency occurred with almost the same frequency (15.3% and 14.4%, respectively). In combined processes, the frequency of luteal phase insufficiency exceeded the frequency of anovulatory cycles by 1.3 times (26.7% and 21.1% respectively).

The high incidence of leiomyoma in combination with other proliferative processes of the uterus allows us to consider it a marker of disorders of the regulation of proliferation and apoptosis processes in the organs of the reproductive system. The diagnosis of uterine leiomyoma, which is established in the reproductive age, serves as the basis for further examination aimed at identifying other hyperplastic processes of the endo- and myometrium. A similar opinion is presented in the works of Ukrainian and foreign authors [5, 7, 31, 32].

The relevance of this problem is due to the significant frequency of this pathology, as well as its negative impact on the generative function and quality of life of women of reproductive age. In order to clarify the features of the hormonal function of the ovaries in patients with isolated and combined proliferative hyperplastic diseases of the uterus, we conducted a comprehensive hormonal and ultrasound examination. According to a number of authors [15, 20, 33], a significant cause of the occurrence and growth of tumors in the myo- and endometrium is absolute or relative hyperestrogenia, anovulation and, as a result, progesterone deficiency. However, there are clinical observations indicating the stimulating role of progesterone in the implementation of autocrine and paracrine effects on the development of uterine fibroids [23, 28, 33].

In our study, it was found that in the reproductive age, combined forms of benign hyperplastic diseases of the uterus develop 1.6 times more often than solitary ones against the background of ovarian failure. Hormonal ovarian failure was observed in 47.8% of patients of reproductive age with combined hyperplastic processes of the endo- and myometrium and 30.0% with solitary processes. Anovulation was observed 1.4 times more often in patients with combined uterine pathology, and luteal phase insufficiency was observed 1.9 times more often ($p < 0.05$).

CONCLUSIONS

1. Hormonal ovarian insufficiency was detected in almost every second woman of reproductive age with combined hyperplastic processes of the endo- and myometrium and in every third with solitary processes of the uterus.

2. Anovulation was observed in 21.1% of patients with combined and in 15.6% with isolated forms of hyperplastic processes of the uterus; luteal phase insufficiency – in 26.7% and 14.4% of patients, respectively ($p < 0.05$).

Conflict of interest. The authors declare no conflicts of interest.

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Стаття надійшла до редакції 17.07.2025. – Дата першого рішення 22.07.2025. – Стаття подана до друку 28.08.2025

ISSN 2708-8723 (print)
ISSN 2708-8731 (online)