The objective: on the basis of a comprehensive examination of women of reproductive age to establish the frequency of phenotypes (clinical variants) of polycystic ovary syndrome (PCOS).

Materials and methods. 34 patients (main group) who complained of menstrual disorders and/or dermatopathies by recommendation of a dermatologist were examined. The control group is represented by 30 women without gynecological and somatic pathology. The mean age of women in the main group was 26.4±0.9 years and 29.1±0.9 years in the control group (p=0.05). The age of women in the study groups ranged from 18 to 35 years. Patients underwent a comprehensive examination to assess the severity of hirsutism and the severity of acne, as well as the body mass index was determined. All women underwent ultrasound examination in the dynamics and quantitative assessment of the concentration of hormones in the blood plasma, namely cortisol, thyroid-stimulating hormone, prolactin, free testosterone and its index, androstenedione, dehydroepiandrosterone sulfate, 17α-ON-progesterone, sex hormone binding globulin. Variation-statistical processing of the results was carried out using the program «STATISTICA 13».

Results. The results of the conducted research show that phenotype A (classical) occurred in 32.4%. Phenotype B (incomplete classical) was diagnosed in 14.7%, and phenotype C (ovulatory) only 8.8%. The most often in 15 (44.1%) women was PCOS, the phenotype D (non-androgenic) was established.

Conclusions. The results of the conducted research show that in women with PCOS clinical symptoms are characterized by menstrual dysfunction (73.5%), infertility (52.9%) and dermatopathies, namely acne (47.1%) and hirsutism (41.2%). According to the laboratory examination, hyperadrogenism was found in 55.9%, which is confirmed by statistically significant (p<0.05) predominance in the main group compared with the control group of androstenedione, free testosterone and its index. In addition, it should be noted that statistically significant (p<0.05) higher levels of 17α-ON-progesterone and prolactin in the main group, but their indicators were within the reference values of the norm.

Keywords: polycystic ovary syndrome, diagnosis, hormonal and ultrasound examination, phenotypes.
Цель исследования: на основании комплексного обследования женщин репродуктивного возраста установить частоту фенотипов (клинических вариантов) синдрома поликистозных яичников (СПКЯ).

Материалы и методы. Обследовано 34 пациентки (основная группа), которые обратились по поводу нарушения менструального цикла и/или дерматопатий по рекомендации дерматолога. Контрольная группа представлена 30 женщинами без гинекологической и смешанной патологии. Средний возраст женщин основной группы составил 26,4±0,9 года и 29,1±0,9 года в группе контроля (p<0,05). Возраст женщин в группах исследования находился в пределах 18–35 лет.

Пациентам проведено комплексное обследование с оценкой выраженности гирсутизма и тяжести течения акне, а также определение индекса массы тела. Всем женщинам выполнено ультразвуковое исследование в динамике и количественная оценка концентрации гормонов в плазме крови, а именно — кортизола, тиреотропного гормона, пролактина, свободного тестостерона и его индекса, андростендиона, дегидроэпиандростерона сульфата, 17α-OH-прогестерона, глобулина, связывающего половые гормоны. Пациенты были обследованы по рекомендации дерматолога, и у 52,9% — бесплодие. Акне и гирсутизм у каждой третьей женщины имели сочетанный характер и диагностированы у 47,1% и 41,2% женщин соответственно. У 94,1% пациенток установлены урогенитальные признаки поликистоза яичников в соответствии с критериями диагностики СПКЯ, а у 88,2% — андростендидиол. По данным лабораторных исследований, гиперандрогения установлена у 55,9%, что подтверждается статистически достоверным (p<0,05) преобладанием в основной группе по сравнению с группой контроля уровней андростендиона, свободного тестостерона и его индекса.

Результаты. По данным проведенного исследования выявлено, что у 73,5% женщин диагностировали нарушения менструального цикла, а у 52,9% — бесплодие. Акне и гирсутизм у каждой третьей женщины имели сочетанный характер и диагностированы у 47,1% и 41,2% женщин соответственно. У 94,1% пациенток установлены урогенитальные признаки поликистоза яичников в соответствии с критериями диагностики СПКЯ, а у 88,2% — андростендидиол. По данным лабораторных исследований, гиперандрогения установлена у 55,9%, что подтверждается статистически достоверным (p<0,05) преобладанием в основной группе по сравнению с группой контроля уровней андростендиона, свободного тестостерона и его индекса.

Заключение. По данным проведенного исследования выявлено, что у женщин с СПКЯ клиническая симптоматика характеризуется менструальной дисфункцией (73,5%), бесплодием (52,9%) и дерматопатиями, в том числе — акне (47,1%) и гирсутизм (41,2%). У 55,9% женщин диагностирована гиперандрогения, что подтверждается статистически достоверным (p<0,05) преобладанием в основной группе по сравнению с группой контроля уровней андростендиона, свободного тестостерона и его индекса.

Ключевые слова: синдром поликистозных яичников, диагностика, гормональное и ультразвуковое исследование, гиросутизм.

**RESULTS**

The main group of the research included 34 patients who complained of menstrual irregularities and/or dermatopaties by recommendation of a dermatologist. The control group is represented by 30 women without gynecological and somatic pathology. The mean age of women in the main group was 26,4±0,9 years and 29,1±0,9 years in the control group (p<0,05). The age of women in the study groups ranged from 18 to 35 years.

**MATERIALS AND METHODS**

The main group of the research included 34 patients who complained of menstrual irregularities and/or dermatopaties by recommendation of a dermatologist. The control group is represented by 30 women without gynecological and somatic pathology. The mean age of women in the main group was 26,4±0,9 years and 29,1±0,9 years in the control group (p<0,05). The age of women in the study groups ranged from 18 to 35 years.
The severity and distribution of hirsutism were determined by a modified Ferriman-Gallwey scale. To assess the severity of acne, women are consulted by a dermatologist. Body mass index (BMI) was determined, which was calculated by the formula \( \text{BMI} = \frac{\text{body weight (kg)}}{\text{height}^2 \text{(m)}} \). According to the WHO, overweight was considered at a BMI of 25.0 kg/m², and obesity – from 30.0 kg/m².

In order to establish the diagnostic criteria that characterize PCOS, a comprehensive clinical and laboratory examination and ultrasound in the dynamics. Quantitative assessment of the concentration of hormones in blood plasma was performed by enzyme-linked immunosorbent assay to determine the level of cortisol – \( C \) (μg/DL), thyroid-stimulating hormone – \( TSH \) (μIU/ml), prolactin – \( Pr \) (ng/ml), free testosterone – \( T \) (pg/ml) and its index (%), androstenedione – \( An \) (ng/ml), dehydroepiandrosterone sulfate – \( \text{DHEA-S} \) (μg/dl) and 17-α-OH-progesterone – \( 17\text{-OHP} \) (ng/ml), sex hormone binding globulin – \( \text{SHBG} \) (nmol/l). The research was performed on the third-fifth day of the menstrual cycle. Due to the fact that HA can be formed in hypothyroidism, hyperprolactinemia and adrenal dysfunction, women with relevant pathology were not included in the study group. Criteria for the diagnosis of PCOS are the presence of at least 2 of the 3 criteria: excessive activity or secretion of androgens (clinical and/or biochemical signs of HA); oligo-/ anovulation; polycystic ovaries according to ultrasound of the pelvic organs (visualization of at least 12 follicles with a diameter of 2–9 mm in at least one ovary) [8].

Each woman was interviewed about the feasibility of additional research methods and consent was obtained. The research matches the modern requirements of moral and ethical norms regarding the rules of ICH/GCP, the Declaration of Helsinki (1964), the Council of Europe Conference on Human Rights and Biomedicine, as well as the provisions of legislative acts of Ukraine.

Variation-statistical processing of results was carried out using licensed standard packages of applications of multidimensional statistical analysis «STATISTICA 13».

**RESULTS**

According to the gynecological anamnesis, 73.5% of women indicated menstrual irregularities and 52.9% – infertility (Pic. 1). Clinical manifestations of menstrual dysfunction included, in particular, oligo- / amenorrhea. According to the ultrasound examination, 94.1% of patients had ultrasound signs of polycystic ovaries according to the criteria for the diagnosis of PCOS. The vast majority of women in the main group, namely 88.2%, have anovulation.

Obesity is often accompanied by PCOS and is an additional significant factor in the formation of metabolic disorders and the subsequent development of serious complications [3]. 3 (8.8%) women were diagnosed with grade I-II obesity and 4 women, which amounted to 11.8%, were overweight.

Clinical manifestations of hyperandrostenedione of women with PCOS are acne, hirsutism (enhanced hair growth in women of the male type – in androgen-dependent areas), seborrhea, androgenic alopecia (baldness by male type), virilization (roughening of the voice, hypertrophy of the mammary glands, android body structure), etc. [8].

Thus, dermatopathies, namely acne and hirsutism, in our research were recorded in 47.5% and 41.2%, cases, respectively, and in every 3rd woman were combined (Pic. 2). According to laboratory examination, it was found that among women of the main group androstenedione levels were increased by more than half, namely in 19 (55.9%). However, according to the assessment of the level of T and its index, an increase of these indicators was found only in 2 (5.9%) and 5 (14.7%) women, respectively. It should be noted that 62.5% of women with acne had elevated androgen levels. Differential diagnosis of HA in order to exclude other diseases primarily involves the exclusion of diseases

| Indicators                          | Main group          | Control group | P     |
|------------------------------------|---------------------|---------------|-------|
| Cortisol (μg/DL)                   | 13,8±1,1            | 12,9±0,9      | p>0,05|
| Thyroid-stimulating hormone (μIU/ml)| 1,8±0,2            | 1,9±0,2       | p>0,05|
| Prolactin (ng/ml)                  | 13,0±0,9            | 11,0±0,5      | p<0,05|
| Free testosterone (pg/ml)          | 4,1±0,6             | 1,9±0,2       | p<0,05|
| Free testosterone index (%)        | 2,8±0,4             | 1,3±0,2       | p<0,05|
| Androstenedione (ng/ml)            | 3,2±0,2             | 1,7±0,1       | p<0,05|
| Dehydroepiandrosterone sulfate (μg/dl) | 192,9±14,7         | 212,0±17,5    | p<0,05|
| 17-α-OH-progesterone (ng/ml)       | 1,4±0,04            | 1,0±0,1       | p<0,05|
| Sex hormone binding globulin (nmol/l)   | 62,2±5,1         | 79,0±7,8      | p<0,05|

**Pic. 1. The frequency of menstrual irregularities and infertility in the main group, %**

**Pic. 2. The frequency of dermatopathies in the main group, %**
of thyroid gland, hyperprolactinemia and non-classical forms of congenital dysfunction of the adrenal cortex [8, 12]. Therefore, for the purpose of differential diagnosis in all patients with suspected PCOS, it is necessary to determine the level of prolactin, 17-OH-progesterone, thyroid-stimulating hormone, T4 free, antibodies to thyroglobulin, antibodies to peroxidase to exclude thyroid pathology [15]. The main criterion for the diagnosis of non-classical form of congenital adrenal dysfunction is an increase in the level of 17-OH-progesterone and in some cases to confirm this diagnosis, genetic research methods can be used [8, 18].

The results of the assessment of the concentration of hormones in the blood of women in the study groups are presented in table. Statistically significant (p<0.05) predominance in the main group compared with the control group was established by the level of An, Tf and its index, as well as 17-OHP and Pr. However, about 17-OHP and Pr, their indicators were within the reference values of the norm in all women in the study groups.

Free and total testosterone are known to have relatively low sensitivity, and among the most informative indicators in the diagnosis of HA, according to the recommendations of the European Endocrine Society (ESS), are the free testosterone index and androstenedione. It should be noted that the study of androgen levels is an auxiliary method for diagnosis and in any case should not be used as the main criterion or substitute for clinical diagnosis of PCOS [8].

There are 4 phenotypes (clinical variants) of PCOS: phenotype A (classical), which is characterized by chronic anovulation, hyperandrogenism, polycystic ovary transformation (according to ultrasound); phenotype B (incomplete classical or anovulatory); hyperandrogenism and oligoanovulation (without ultrasound signs of polycystic ovarian morphology); phenotype C (ovulatory): hyperandrogenism and polycystic ovarian morphology (according to ultrasound) on the background of regular ovulatory cycles; phenotype D (non-androgenic): chronic anovulation and polycystic ovary transformation (according to ultrasound) without clinical / biochemical hyperandrogenism [2, 4, 8, 9].

Analyzing the frequency of phenotypes (clinical variants) of PCOS, it was found (Pic. 3) that phenotype A (classical) occurred in 44.1%, phenotype B (incomplete classical) was diagnosed in 14.7%, and phenotype C (ovulatory) in only 8.8%.

The most often, namely in 15 (44.1%) women with PCOS, the phenotype D (non-androgenic) was established.

### CONCLUSIONS

1. The results of the conducted research show that in women with PCOS clinical symptoms are characterized by menstrual dysfunction (73.5%), infertility (52.9%) and dermatopathies, namely acne (47.1%) and hirsutism (41.2%).

2. In the group of women with PCOS it was found a statistically significant (p<0.05) predominance of the level of androstenedione, free testosterone and its index (An – 3.2±0.2 ng/ml, Tf – 4.1±0.6 pg/ml and TF index – 2.8±0.4%, respectively) compared with the control group (An – 1.7±0.2 ng/ml, Tf – 1.9±0.2 pg/ml and TF index – 1.3±0.2%, respectively).

3. Among the clinical variants of PCOS, the most often diagnosed was non-androgenic phenotype (phenotype D), the frequency of which was 44.1%. Classical (phenotype A) and incomplete classical (phenotype B) were established in 32.4% and 14.7%, respectively. It should be noted that only 8.8% women with PCOS were diagnosed with phenotype C (ovulatory).

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REFERENCES

1. Abasheva E.I., Shalina M.A., Misharina E.V., Tkachenko M.N., Bulgakova O.L. Clinical characteristics of phenotypes of the polycystic ovary syndrome in women with normogonadotropic anovulation in reproductive age // Journal of Aкушерства и гинекологии. 2019; 68, 3: 7-14.

2. Adsami H.B., Kabakova O.V., Barovskiy D.S., Sriv K.V. Synthesis of patient management in patients with polycystic ovaries. Zaporozhye medical journal. 2020; 22, 6 (123): 865-873.

3. Bacsmanovich A.E., Petrov Yu.A., Alekhn A.G. Syndrome of polycystic ovaries: classic and modern aspects. Health and Education Millennium. 2018; 20, 4: 33-37.

4. Burke O.A., Tugachevsky T.M. Synthesis of clinical guidelines for diagnosis and treatment of polycystic ovaries in women. Reproductive endocrinology. 2019; 2 (42): 39-45.

5. Kabakova L.A. Syndrome of polycystic ovaries: individualized approach to treatment. Reproductive medicine. 2020; 1 (42): 27-34.

6. Zaslavsky D.V., Prokopchenko A.D., Danylen A.A. Dermato-ovarian syndrome in patients with polycystic ovaries. International endocrinology journal. 2018; 14, 1: 40-45.

7. Caluigi L.V., Tatarchuk T.F. Syndrome of polycystic ovaries: approach to the correction of metabolic disorders. Reproductive endocrinology. 2020; 2 (52): 54-58.

8. Kaminskij V.V., Tatarchuk T.F., Dubossarskaia Yu.O. and others. National consensus on polycystic ovaries. Zaporozhye medical journal. 2019; 21 (1): 100-103.

9. Legro R.S., Arslanian S.A., Ehrmann D.A. et al. Diagnosis and treatment of polycystic ovary syndrome: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2013; 98 (12): 4565-92.

10. Suturina L.V. The syndrome of polycystic ovaries in the XXI century. Aкушерство и гинекология: news, views, learning. 2017; 3: 86-91.

11. Urbanovich A.M. The syndrome of polycystic ovaries in daily practice. International endocrinology journal. 2018; 14, 1: 40-45.

12. Chuchua S.B. Hormonal pharmacotherapy in the syndrome of polycystic ovaries. Reproductive medicine. 2019; 1 (45): 52-56.

13. Baskind N.E., Balen A.H. Hypothalamic-pituitary, ovarian and adrenal contributions to polycystic ovary syndrome. Best Practice & Research Clinical Obstetrics & Gynaecology. 2016; 37: 180-197.

14. Speiser P.W., Arlt W., Auchus R.J. et al. Congenital adrenal hyperplasia due to steroid 21-hydroxylase deficiency: an Endocrine Society clinical practice guideline. The Journal of Clinical Endocrinology & Metabolism. 2018; 103, 11: 4043-4088.