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Features of Hormonal Status in Women with Polycystic Ovary Syndrome

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Abstract: Purpose of the study: To study the features of the clinical course of polycystic ovary syndrome. 30 patients with PCOS were selected for observation. In women with PCOS, disturbances in hormonal status are expressed mainly by excessive production of LH, and also in the ovaries, excessive formation of male sex hormones - testosterone is stimulated, and the levels of FSH, glucose and 17-OPN are within the reference values.

Keywords: polycystic ovary syndrome, hirsutism, body mass index, menstrual irregularities, amenorrhea.

Relevance: Polycystic ovary syndrome or polycystic ovary syndrome (PCOS) is a hormonal disease that leads to infertility due to the fact that ovulation does not occur in a woman's body, i.e. the release of an egg from the ovary in a specific phase of the cycle. With this disease, the formation of multiple cysts filled with fluid containing immature eggs occurs outside and/or inside the ovarian capsule. These benign neoplasms can be located either separately from each other or merging into a single body resembling a bunch of grapes [1,3,7].

PCOS mainly occurs in women of reproductive age, among whom the incidence of the disease is 4–12%. The frequency of detection of this disease is quite variable due to the heterogeneity of clinical and endocrinological manifestations and the ambiguity of their assessment. In various European studies, the prevalence of PCOS is 6.5–8%. The disease is especially common in patients with anovulatory infertility, hyperandrogenism and associated dermatopathies. It should be noted that in the last decade there has been an increase in the number of patients who do not have typical manifestations of PCOS [2,6,8].

The pathogenesis of PCOS seems extremely complex and, despite the large number of proposed theories of the development of the disease, none of them has fully revealed the causes and mechanisms of development of endocrinological and metabolic disorders in this disease. There are many supporters of the hypothesis about the formation of PCOS against the background of a primary (from puberty) disturbance of the circhoral rhythm of GnRH. During puberty, which is critical in a girl's life, many environmental factors, heredity, etc. can contribute to the development of a number of endocrinopathies[1,5].

Of course, an important role is played by stress, which increases the synthesis of opioids (β-endorphin) and disrupts the neuroendocrine control of the regulation of the secretion of GnRH and gonadotropins. At the same time, the basal level of LH secretion increases against the background of a relative decrease in FSH production. Increased stimulation of LH disrupts the process of folliculogenesis: cystic atresia of the follicles with hyperplasia of theca cells, stroma and increased synthesis of androgens is formed in the ovaries. Against the background of a lack of FSH, androgens accumulate and estradiol deficiency occurs[3,4]. The latter stimulates the

synthesis of LH, increasing its basal level. The resulting GA also promotes follicular atresia, hyperplasia of theca cell stroma and tunica albuginea. In addition, it is known that the degree of GA is positively correlated with the level of inhibin B, which suppresses the secretion of FSH.

Purpose of the study: to study the hormonal status in women with polycystic ovary syndrome.

Materials and methods of research: 30 patients with PCOS were selected for observation. The diagnosis was determined based on ICD-10. The criteria for inclusion in the main group was the presence of PCOS, the diagnosis of which was based on the provisions adopted at the World Consensus in the Netherlands (2003), according to which the presence of 2 out of 3 signs is necessary:

1. Oligo and/or anovulation (ovulatory function was assessed according to dynamic ultrasound examination of the pelvic organs and functional diagnostic data).

2. Clinical and/or biochemical signs of hyperandrogenism (hirsute number on the Ferriman-Galwey scale, the presence and severity of acne vulgaris, androgen-related alopecia, as well as a study of the hormonal profile were assessed.

3. Polycystic changes in the ovaries (using ultrasonography of the pelvic organs).

All patients, based on anamnestic data, were assessed for menstrual and reproductive function, the time of onset of the first symptoms and the duration of hyperandrogenism. All patients underwent a standard clinical examination, which included anthropometric indicators, BMI, WC and WC/WC, determination of the severity of hirsutism (in points on the Ferriman-Galwey scale) and the presence and intensity of acne vulgaris. Ovulatory function was assessed according to dynamic ultrasound examination of the pelvic organs and functional diagnostic data.

The criteria for inclusion of girls in the control group were age from 18 to 35 years, the absence of somatic and gynecological diseases. The exclusion criteria were reproductive disorders, the presence of relatives with PCOS.

Statistical processing of the obtained results was carried out using the methods of variation statistics using the application package Statistica for Windows. Digital data was processed on a personal computer using the memory of Microsoft Exell application programs. Information was considered reliable if $t \geq 2$ and $p < 0.05$.

Results and discussions

Genetic predisposition is of great importance in the occurrence of polycystic ovary syndrome. Changes in the structure of one or more genes that control the metabolic processes of glucose metabolism and genes responsible for the synthesis of steroid hormones and individual tissue sensitivity to androgens can cause the development of clinical symptoms characteristic of PCOS.

Hormonal studies revealed that the patients of the main group differed significantly from the control girls in terms of steroid fractions in the blood (levels of total and free testosterone, 17-OHP), the nature of gonadotropic secretion (LH/FSH), and carbohydrate metabolism indicators (Table 1.).

Table 1. Indicators of hormonal status in PCOS

	Main group (n=30)	Control group (n=30)
LH (units/l)	9,41±1,87	4,79±0,95
FSH (units/l)	5,43±1,24	5,71±1,18
Totaltestosterone (nmol/l)	2,14±0,32	0,72±0,32
Free testosterone	5,56±0,33	1,21±0,21
17-OPN (nmol/l)	2,51±0,19	2,04±0,17
Glucose (mmol/l)	4,74±0,45	4,03±0,38

As a result of genetically programmed patients with PCOS, premature and excessive production of LH is observed, which is 9.41±1.87 units/l, which is 1.96 times higher than in the control group, and the level of the FSH hormone does not differ significantly between the studied in groups. In addition, it should be noted that in the main group, the excessive formation of male sex hormones - testosterone - is stimulated in the ovaries. The concentration of total and free testosterone in the base group is 2.97 and 4.59 times higher than in the control group, as a result of which the processes of follicular development are disrupted, which leads to anovulation.The levels of glucose and 17-OPN in the study group were slightly higher compared to the control group.

PCOS with normal body weight is clinically manifested by menstrual irregularities, usually in the form of oligoamenorrhea (increased cycle duration and decreased duration of monthly bleeding to three days or less) and/or acyclic uterine bleeding.

PCOS, combined with obesity (in 50-70% of cases), is also characterized by hyperinsulinemia and changes in the blood lipid spectrum, which increases the risk of developing cardiovascular diseases, type 2 diabetes and leads to a decrease in average life expectancy.

Conclusions: in women with PCOS, disturbances in hormonal status are expressed mainly by excessive production of LH, and also in the ovaries, excessive formation of male sex hormones - testosterone is stimulated, and the levels of FSH, glucose and 17-OPN are within the reference values.

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