

## POLYCYSTIC OVARY SYNDROME

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**Annotation.** *The article presents data on the relationship between the pathogenetic mechanisms of development of menstrual cycle disorders of functional and organic origin and mental disorders from the point of view of the psychosomatic concept. According to the latter, functional disorders of the menstrual cycle are considered psychosomatic, in which gynecological pathology develops as a result of psychopathological disorders. A striking example of such a disease is functional hypothalamic amenorrhea. At the same time, endocrinopathies and polycystic ovary syndrome are caused by the high prevalence of anxiety and depressive disorders in this cohort of patients. This review highlights the importance of interdisciplinary collaboration between gynecologist and psychiatrist for the most effective reproductive rehabilitation of patients with amenorrhea. The literature search was carried out in domestic and international databases in Russian and English. Free access to the full text of articles was a priority. The selection of sources was prioritized for the period from 2021 to 2023. However, given the insufficient knowledge of the chosen topic, the selection of sources dates back to 1999.*

**Keywords:** *polycystic ovary syndrome, depression, dysfunction, amenorrhea.*

**Introduction.** PCOS and FHA have a similar clinical picture, so their differential diagnosis presents some difficulties. Menstrual irregularities up to amenorrhea, rare ovulations, multifollicular or polycystic ovaries on ultrasound can occur equally often in both cases, although the pathophysiology of these syndromes is completely different. To date, the Rotterdam criteria for diagnosing PCOS, proposed back in 2010, are used [41]. The pathogenesis of this disease is based on hyperandrogenism and insulin resistance, but its etiology is still completely unknown. Can this syndrome be considered a psychosomatic disease in the classical sense? Probably,

hyperandrogenism will be the very “somatic” soil on which personality characteristics are layered, and then we are talking about the high prevalence of anxiety and depressive disorders that develop against the background of clinical manifestations of excess androgens, obesity and infertility. But what if, after eliminating cosmetic defects, stabilizing menstrual function and losing weight, it is not possible to maintain persistent ovulation? Is it possible that a relapse of PCOS is associated with a lack of correction of mental status and that long-term remission requires an adequate indicator of the patient’s mental health, taking into account the chronic course of the disease? There is no clear answer to these questions yet. It is known that among patients with PCOS there is a high prevalence of various borderline psychopathological disorders, such as depressive, obsessive-compulsive disorders, personality disorders, generalized anxiety disorder, social phobias, attention deficit hyperactivity disorder, and eating disorders. Psychotic disorders (bipolar affective disorders, schizophrenia and others) are also more often diagnosed in women with ovarian hyperandrogenism than in the general population. In addition, the high frequency of psychopathologies may also be due to both hyperandrogenism itself and secondary depressive and anxiety disorders arising from the development of androgenic dermatopathy (acne, hirsutism, alopecia), obesity, infertility, which undoubtedly stigmatizes women and reduces their quality of life [42]. The influence of chronic inflammation on the development of depressive disorders, including PCOS, is being actively studied [43]. Psychopathology can aggravate the course of this syndrome and complicate treatment, especially for anovulatory infertility, which is sometimes difficult to correct even with the use of assisted reproductive technologies [34]. An interesting fact is that among siblings of PCOS patients there is an equally high risk of developing various mental disorders. The source of the problem appears to be the adverse effects of androgens on brain formation in utero. Perhaps hyperandrogenism causes changes in its structure, leading to abnormal responses to steroid hormones. Experimental models have shown that with an excess of male hormones, the so-called “masculinization” of the brain develops, which contributes to the programming of appropriate behavior patterns in the future [35]. It is possible that early exposure of androgen receptors in this organ may irreversibly reorganize it and lead to hyperactivity of GnRH neurons in adult life, which ultimately stimulates excess LH secretion [36]. And then the patient, genetically predisposed to certain physiological processes, implements the programmed “androgenic” scenario throughout her life. Given the chronicity of PCOS, an important aspect of the management of women of reproductive age is the assessment of quality of life and the psychosocial impact of the disease [37]. A. Rempert et al. analyzed data from 14 randomized controlled and 19 observational studies, which examined quality of life indicators using standardized questionnaires before and after treatment for the

syndrome, and compared them with similar values in the control group [38]. The authors concluded that PCOS has comparable or superior effects on quality of life to heart disease, diabetes, and breast cancer. After treatment, indicators related to mental health, infertility, sexual dysfunction, obesity, menstrual irregularities and hirsutism improve. In a recent work by A. Adamczak et al. assessed the indirect effect of time perspective on the development of depressive symptoms in patients with PCOS using standardized questionnaires (Beck Depression Inventory BDI-II and Zimbardo ZTPI Inventory) [39]. Time perspective is the totality of a person's ideas about his psychological future and past that exist at a given moment in time. This term is used to describe an individual's positive and negative attitudes towards the past and future, as well as hedonistic and fatalistic attitudes towards the present. For example, a negative view of the past can create a pessimistic and depressive attitude towards the present or future. Researchers have observed that changes in time perspective parameters are often associated with the development of depressive symptoms. The Zimbardo ZTPI questionnaire allows you to analyze the condition of patients on 4 scales: the positive past scale assesses concentration on the positive past; negative past scale - concentration on the negative past, i.e. thinking about unpleasant memories and failures; the hedonic present scale refers to a focus on immediate pleasures regardless of the consequences of one's impulsive actions; The future scale measures future orientation, i.e. focus on planning, success and consistent implementation of one's life goals. A study involving 83 affected and 65 healthy women found an indirect effect of depressive symptoms on PCOS through a positive outlook on the future. The time perspective is related to the psychosomatic symptoms of the syndrome, quality of life, stress, and the formation of responsible health behavior. A positive outlook for the future influences a young woman's understanding of her personal needs through awareness of her psychosexuality, including the successful implementation of reproductive function (sexual life, starting a family, having children). A depressive mood is associated with anxiety about the future, negative perceptions of potential partners, and avoidant behavior in building close relationships due to fears of making mistakes, being disappointed, and experiencing mental pain. Probably, a negative attitude towards the need to realize personal life in the future actualizes psychosomatic relationships that are closely related to disorders of psychosexual self-perception, negatively affects the realization of the possibility of attracting a prosperous partner, and thereby has a depressing effect on the reproductive system. Moreover, clinical manifestations of hyperandrogenism (acne, hirsutism, alopecia) make patients feel less attractive, which negatively affects their mental health due to decreased self-esteem and physical satisfaction [40]. The work of an interdisciplinary team, including a psychotherapist and clinical psychologist, can help women maintain self-sufficiency

and the ability to influence their life situation, thus, the inclusion of educational and therapeutic psychotraining is a preventive measure in the development of depressive disorders associated with PCOS and increases stress resistance. One approach that can improve the mental health and quality of life of patients with ovarian hyperandrogenism is CBT. Its impact on anxiety, depression and quality of life was assessed by S. Majidzadeh et al. among 84 patients with PCOS randomized into the main group and the control group [41]. Counseling was carried out for 60–90 minutes, a total of 8 sessions, weekly in groups of 5–7 people, mental status analysis was carried out using Beck questionnaires and the PCOSQ quality of life questionnaire. In the CBT group, anxiety and depression scores were significantly lower compared to the control group, and the average quality of life score was higher. Confirmation of the effectiveness of psychotherapeutic techniques in patients with PCOS was demonstrated by H. Dema et al., moreover, they found dynamic changes in DNA methylation in the peripheral blood of 4 genes: COMT, FST, FKBP51 and MAOA [52]. Epigenetic changes, such as DNA methylation, may play a role in the development and progression of abnormal ovarian function and metabolic abnormalities in ovarian hyperandrogenism. It is likely that these epigenetic processes are a response to various interventions aimed at changing health factors and lifestyle factors. Of course, we cannot ignore the fact that non-pharmacological methods of influence (lifestyle modification, adherence to the principles of rational nutrition and dosed physical activity) in most cases already help control the course of PCOS, especially in patients with a metabolic phenotype. Physical exercise can have a positive effect not only on metabolic parameters, but also on the mental health of patients, as demonstrated by I. Santos et al. in a randomized clinical trial [33]. 23 young women with PCOS were randomly assigned to 2 groups: in the main group, participants engaged in intense physical activity for 40–60 minutes per day, 3 days a week, for 12 weeks, followed by complete cessation of exercise for 30 days, in the control group the patients did not exercise. Mental health was assessed using the SF-36 questionnaire and the Depression, Anxiety and Stress Scale (DASS-21) at 3 points: 1) at baseline; 2) after 12 weeks of sports; 3) after 30 days of no training. In the main group, throughout the entire period of exercise, patients noted a significant improvement in quality of life indicators: physical capabilities and general perception of health, while the severity of symptoms of anxiety and depression decreased significantly, but after 30 days of no training, the indicators changed for the worse, and the mental status was extremely unstable. It follows from this that when the practice of physical activity is interrupted or stopped, the positive adaptive changes in the body are leveled out after only 4 weeks. This once again confirms the need to adhere to the principles of maintaining health in patients with PCOS throughout their lives. In a similar study, R. Patten et al. went

further and tried to find out what intensity of exercise would provide better control of psychological and physical parameters in case of ovarian hyperandrogenism and excess body weight in women with PCOS [40]. The authors compared high-intensity interval training and standard moderate-intensity continuous training and found that the former significantly reduced self-report measures of depression, anxiety, and stress, while the latter only significantly reduced measures of stress. This study highlights the potential of high-intensity exercise to improve mental health and quality of life and may be an optimal strategy for reducing symptoms of depression and anxiety. Why does physical activity lead to such significant changes? There is a known association between insulin resistance, metabolic syndrome and the risk of depression in PCOS [41]. Probably, during training, hyperinsulinemia and insulin resistance decrease, the level of sex steroid-binding globulin increases, and excess androgens are “utilized,” i.e. 2 main pathogenetic links of the disease are neutralized and, as a result, menstrual and ovulatory function is restored, and the patient becomes more satisfied with her appearance. Serotonin may make an additional contribution which is intensively produced during sports [43]. On the other hand, there is no data on how excessive physical activity in the long term affects psychopathological disorders that manifested themselves before the start of training. After all, as you know, with anhedonia and apathy there is no desire or strength to engage in physical activity, which is why recommendations to follow an active training regimen and a healthy lifestyle may be violated, and without treatment of depressive disorders this will be ineffective.

**Conclusions.** Thus, treatment of PCOS should not be limited to the prescription of hormonal drugs; a mandatory condition is the inclusion of a psychotherapist and a clinical psychologist in the team of specialists for optimal psychopharmacological support and psychotherapeutic correction of the patient’s pathologically distorted cognitions in the process of psychotherapy in order to increase self-esteem, improve quality of life and normalize reproductive function.

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