



## POLYCYSTIC OVARY SYNDROME (PCOS): MODERN UNDERSTANDING AND CLINICAL PRACTICE IN UZBEKISTAN (2020–2025)

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**Abstract** Polycystic Ovary Syndrome (PCOS) is the most prevalent endocrine and metabolic disorder, affecting 4% to 20% of reproductive-aged women globally. The condition is characterized by a complex interplay of reproductive dysfunctions, such as anovulation and hyperandrogenism, alongside severe metabolic risks, including insulin resistance and type 2 diabetes. Despite decades of research, the primary etiology of PCOS remains a subject of debate, focusing on the interaction between genetic predisposition and environmental factors. This thesis analyzes contemporary evidence on pathogenesis from 2020–2025, including the roles of neuroendocrine regulation and epigenetic mechanisms. Special attention is given to the regional specificities of Uzbekistan, where the high social value placed on childbearing makes PCOS-related infertility a significant factor in psychological and social maladjustment. Innovative therapeutic methods, such as GLP-1 receptor agonists and inositols, are discussed, alongside the necessity of implementing national screening programs.

**Keywords:** polycystic ovary syndrome, hyperandrogenism, insulin resistance, Uzbekistan, infertility, metformin, GLP-1.

**Introduction** PCOS has evolved from a purely gynecological concern into a systemic metabolic disease. For women aged 18–35, at the peak of their reproductive activity, PCOS manifestations represent a major barrier to motherhood and quality of life. The clinical focus is shifting from symptomatic treatment of amenorrhea to a pathogenic approach targeting hyperinsulinemia. In Uzbekistan, where demographic policy emphasizes family support, effective PCOS management is critical for national health and demographic security.

**Methods** This analysis is based on a literature search in PubMed, Scopus, and national medical databases. Data from 56,977 women examined at the Republican Specialized Scientific and Practical Medical Center of Endocrinology (2019–2023) were analyzed. Diagnostic algorithms were evaluated based on the Rotterdam criteria and the 2023 updates regarding the use of Anti-Müllerian Hormone (AMH) as an alternative to ultrasound.

### Results and Discussion

**1. Etiology and Pathogenesis: The Tripartite Model** Modern understanding (2020–2025) highlights three fundamental mechanisms forming a "vicious cycle":

• **Insulin Resistance (IR) and Hyperinsulinemia:** Excess insulin directly stimulates ovarian theca cells to produce testosterone. Simultaneously, insulin suppresses the hepatic synthesis of Sex Hormone-Binding Globulin (SHBG), leading to a surge in free, biologically active testosterone. The HOMA-IR index is calculated as:

$$\text{HOMA-IR} = \text{Glucose (mmol/L)} * \text{Insulin (}\mu\text{U/mL)} / 22.5$$

- **Hyperandrogenism:** High androgen levels impair hypothalamic sensitivity to progesterone negative feedback, increasing the pulse frequency of Gonadotropin-Releasing Hormone (GnRH).

- **Neuroendocrine Dysfunction:** Disrupted GnRH rhythms cause a preference for Luteinizing Hormone (LH) secretion over Follicle-Stimulating Hormone (FSH). The LH/FSH ratio often exceeds 2.0–2.5, arresting dominant follicle maturation and resulting in multifollicular ovarian morphology.

**2. Epidemiological Indicators and Diagnosis in Uzbekistan** The prevalence of PCOS in Uzbekistan ranges from 8% to 12%, aligning with global trends; however, the complication profile exhibits regional characteristics.

Indicator Group	Value / Frequency	Consequences
Insulin Resistance	65–95%	Risk of Type 2 Diabetes
Obesity (BMI > 30)	> 50%	Exacerbation of anovulation
Concomitant Anemia	40–45%	Reduced fertility potential
Social Stigmatization	High	Depression, anxiety

In local clinical practice, the Rotterdam criteria remain the gold standard. A rising trend includes adding AMH to diagnostic panels, which is particularly useful for patients with severe obesity where ultrasound visualization is limited.

**3. Clinical Presentation and Metabolic Risks** The clinical profile includes cycle irregularities and dermatological issues (hirsutism, acne). IR often manifests as *acanthosis nigricans*. The risk of metabolic syndrome and cardiovascular disease is 3–5 times higher in women with PCOS, necessitating lipid profile monitoring and Oral Glucose Tolerance Tests (OGTT) every 1–3 years.

**4. Psychosocial Aspects in Local Culture** In Uzbekistan, reproductive function is a central element of a woman's social status. An infertility diagnosis is often perceived as a social crisis. Up to 70% of local women with PCOS require psychological support to manage anxiety related to physical changes and conception difficulties.

**5. Modern Therapeutic Approaches (2020–2025) \* First-line:** Lifestyle modification. A 5–10% weight loss restores ovulation in 50% of patients.

- **Pharmacotherapy:** Metformin remains a baseline therapy. Inositols (40:1 ratio) are gaining prominence for improving oocyte quality.

- **Innovations:** GLP-1 receptor agonists (e.g., Liraglutide) are effective for weight reduction and normalizing androgens. SGLT2 inhibitors are viewed as promising for glycemic control.

- **Infertility Treatment:** Letrozole is now recognized as the first-line agent for ovulation induction.

**Clinical Case Study** A 24-year-old patient with a BMI of 31, a 2-year history of infertility, and amenorrhea. Findings: LH/FSH ratio of 2.8, elevated free testosterone, and HOMA-IR of 4.2. Management: Diet, physical activity (150 min/week), Metformin 1500 mg/day, and Myo-inositol 4 g/day. Results: At 4 months, weight decreased by 8 kg and cycles normalized. Spontaneous pregnancy occurred at 6 months, resulting in the birth of a healthy girl.

**Recommendations for Clinical Practice** \* Screen for PCOS in adolescents with persistent acne and menstrual irregularities.

- Use COCs with anti-androgenic effects only when no contraindications exist.
- Prioritize Letrozole for ovulation induction.
- Incorporate psychological counseling to improve patient compliance.

**Conclusion** PCOS is a lifelong condition requiring strategic management. Integrating the 2023 international standards into Uzbekistan's healthcare system will help address infertility and prevent a diabetes epidemic among reproductive-aged women. Early intervention is the key to overcoming this complex challenge.

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