

# Research Progress in Clinical Treatment of Polycystic Ovary Syndrome from the Perspective of Evidence-Based Medicine: A Comprehensive Evaluation of Hormonal Therapy and Traditional Chinese Medicine Regimens

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**Abstract:** Polycystic ovary syndrome (PCOS) is a common endocrine disorder that significantly impairs female fertility and overall health. With the advancement of evidence-based medicine, therapeutic approaches for PCOS have become increasingly diversified. As two major treatment modalities, hormonal therapy and traditional Chinese medicine (TCM) have attracted widespread attention. Although numerous studies have explored the efficacy and safety of different treatment regimens, many controversies and deficiencies still exist in clinical practice. From the perspective of evidence-based medicine, this review systematically assesses the clinical application effects of hormonal therapy and TCM for PCOS. Through a comprehensive analysis of relevant literature, it compares the efficacy of various treatments and puts forward evidence-based therapeutic recommendations. This study aims to provide a scientific reference for clinical decision-making and promote the progress of comprehensive management and treatment of PCOS.

**Keywords:** Polycystic ovary syndrome; Evidence-based medicine; Hormonal therapy; Traditional Chinese medicine; Clinical treatment

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## 1. Introduction

Polycystic ovary syndrome (PCOS) is a complex endocrine disease, mainly characterized by polycystic ovarian changes, irregular menstruation, and a variety of metabolic abnormalities, including insulin resistance and obesity. Its pathogenesis has not been fully elucidated, yet it is closely associated with multiple factors such as heredity, environment and lifestyle. In recent years, as the understanding of PCOS

deepens, clinical treatment strategies have become more sophisticated. Traditional treatment mainly relies on hormonal therapy. Along with the development of evidence-based medicine and TCM, a growing number of studies have focused on the application of TCM in PCOS treatment. Evidence-based medicine is a medical decision-making model based on research evidence, which emphasizes integrating the best available research evidence, clinical experience and patients' values in clinical practice. In the treatment of PCOS, evidence-based medicine provides a more scientific basis for clinical decisions and enables more individualized and precise selection of treatment strategies. Recent studies have demonstrated that hormonal therapy can effectively relieve irregular menstruation, restore ovulatory function, and ameliorate metabolic abnormalities in PCOS patients <sup>[1]</sup>, while TCM shows unique advantages in improving physical constitution and overall symptoms <sup>[2]</sup>. This article comprehensively reviews the latest research progress of hormonal therapy and TCM for PCOS treatment, and proposes effective clinical treatment strategies from the perspective of evidence-based medicine. By reviewing and analyzing relevant literature, we discuss the efficacy and safety of different therapies, so as to offer a more scientific basis for the management of PCOS patients. It is hoped that this review can provide references for clinical treatment of PCOS.

## **2. Pathophysiology and therapeutic approaches for polycystic ovary syndrome: from hormonal therapy to traditional Chinese medicine**

### **2.1. Pathophysiological mechanisms of polycystic ovary syndrome**

#### **2.1.1. Endocrine disorders and metabolic abnormalities**

The core manifestations of PCOS include endocrine disorders and metabolic abnormalities. PCOS patients usually present with hyperandrogenism, irregular menstruation, as well as quantitative and morphological changes of ovarian follicles under ultrasonography. Endocrine disorders are mainly reflected in abnormal hormone secretion in the ovaries and pituitary gland. Among them, insulin resistance is regarded as one of the vital pathophysiological mechanisms of PCOS. Studies have shown that decreased insulin sensitivity in PCOS patients leads to elevated insulin levels, which further stimulate the ovaries to produce more androgens, aggravate hyperandrogenism and hinder follicular development <sup>[3]</sup>. PCOS is also closely correlated with metabolic syndrome. Many patients suffer from metabolic disorders such as obesity, hyperglycemia and hyperlipidemia, which increase the risk of cardiovascular diseases <sup>[4]</sup>. In terms of metabolic abnormalities, PCOS patients are often accompanied by lipid metabolism disorders, manifested as elevated triglycerides and decreased high-density lipoprotein cholesterol. This condition is associated with increased levels of systemic inflammation and oxidative stress <sup>[1]</sup>. Researches indicate that the application of antioxidants may help alleviate oxidative stress, so as to improve the endocrine and metabolic status of PCOS patients <sup>[2]</sup>. Comprehensive interventions targeting endocrine and metabolic abnormalities, including lifestyle modification and pharmacotherapy, are of great significance for the treatment of PCOS.

#### **2.1.2. Impacts of genetic and environmental factors**

The pathogenesis of PCOS is affected not only by endocrine and metabolic factors, but also by genetic and environmental factors, which cannot be ignored. Recent relevant studies have proved that PCOS has an obvious familial aggregation. Many immediate relatives of patients have similar symptoms, suggesting that genetic factors play a pivotal role in the onset of PCOS <sup>[5]</sup>. Specifically, multiple genes related to insulin signaling pathways, as well as androgen synthesis and metabolism, are correlated with the risk of PCOS <sup>[6]</sup>.

Environmental pollution, dietary habits and lifestyles may all affect the occurrence and progression of PCOS. Exposure to endocrine disruptors such as bisphenol A can disturb hormonal balance in the human body and further increase the risk of developing PCOS <sup>[7]</sup>. In addition, lifestyle factors, including obesity and physical inactivity, are recognized as important risk factors for PCOS. Obesity not only exacerbates insulin resistance but also worsens PCOS symptoms by affecting hormone levels <sup>[8]</sup>. Therefore, understanding the interaction between genetic and environmental factors provides important guidance for the prevention and treatment of PCOS.

## **2.2. Clinical application of hormonal therapy**

### **2.2.1. Selective estrogen receptor modulators (SERMs)**

Selective estrogen receptor modulators (SERMs) are a class of tissue-specific drugs that exert pharmacological effects by selectively activating or inhibiting estrogen receptors. SERMs show promising prospects in a variety of clinical applications. In research on neuroendocrine diseases, SERMs can promote remyelination in the central nervous system independent of estrogen receptor activation <sup>[9]</sup>. They also exert positive regulatory effects on metabolism by modulating estrogen signaling pathways <sup>[10]</sup>.

### **2.2.2. Oral contraceptives and their mechanisms of action**

Oral contraceptives are mainly composed of estrogen and progestogen. They exert contraceptive effects through multiple mechanisms and also play a certain role in the treatment of PCOS. In recent years, studies have found that some new-generation oral contraceptives (such as the combination containing estetrol and drospirenone) achieve satisfactory efficacy in relieving irregular menstruation and premenstrual syndrome <sup>[11]</sup>. Despite the remarkable effect of oral contraceptives in improving menstrual disorders, attention should be paid to their potential side effects in clinical application, such as increased risks of thrombosis and breast cancer <sup>[12]</sup>. Clinicians shall fully evaluate patients' physical conditions and risk factors before making prescriptions in clinical practice.

### **2.2.3. Insulin sensitizers**

Insulin sensitizers (represented by metformin) play an important role in the treatment of PCOS. They can effectively improve insulin sensitivity, help regulate menstrual cycles and promote ovulation <sup>[13]</sup>. Studies have shown that metformin can not only lower blood glucose, but also ameliorate PCOS-related metabolic abnormalities such as hyperinsulinemia and obesity <sup>[14]</sup>. Furthermore, metformin is proven to improve fertility and increase ovulation rate, especially for obese PCOS patients <sup>[15]</sup>. Recent studies also point out that combining metformin with other treatments, such as lifestyle interventions and other medications, can further enhance therapeutic effects <sup>[16]</sup>. Although insulin sensitizers have remarkable efficacy in the treatment of PCOS, their potential adverse reactions still require close attention.

## **2.3. Theoretical basis and clinical practice of TCM in treating PCOS**

### **2.3.1. TCM understanding of polycystic ovary syndrome**

From the perspective of TCM, the onset of PCOS is closely related to liver Qi stagnation, deficiency of both spleen and kidney, and internal retention of phlegm-dampness, which leads to disordered Qi and blood as well as imbalance of yin and yang. Liver Qi stagnation disturbs menstrual cycles and causes ovarian dysfunction; spleen deficiency and internal retention of phlegm-dampness may lead to accumulation of

phlegm-dampness in the body and consequently result in polycystic ovarian changes; kidney deficiency impairs reproductive function and affects the quality and quantity of oocytes <sup>[17]</sup>. Meanwhile, TCM attaches great importance to emotional factors. In the TCM treatment of PCOS, syndrome differentiation and treatment are often adopted in combination with patients' emotional states. The treatment aims to soothe Qi movement, restore the balance of Qi and blood, improve endocrine function, and thereby promote the normal physiological activities of the ovaries <sup>[18]</sup>.

### **2.3.2. Efficacy research on Chinese herbal compounds**

Chinese herbal medicines occupy an important position in the treatment of PCOS. Studies have verified that classic TCM formulas, including Siwu Decoction and Xiaoyao Powder, have significant effects on regulating menstruation and improving ovarian function <sup>[19]</sup>. With in-depth research on the active ingredients and action mechanisms of Chinese herbs in recent years, scholars have found that certain herbal components, such as tanshinone, can improve insulin sensitivity and regulate endocrine levels, so as to relieve PCOS-related symptoms <sup>[20]</sup>. In addition, the application of network pharmacology enables researchers to better interpret the action mechanisms of herbal compounds and explore their potential in regulating endocrine and metabolism for PCOS treatment <sup>[21]</sup>.

### **2.3.3. Evidence-based analysis of acupuncture efficacy**

Acupuncture also delivers favorable therapeutic effects in the treatment of PCOS. Multiple clinical studies have confirmed that acupuncture can effectively relieve irregular menstruation and abnormal hormone levels in PCOS patients <sup>[22]</sup>. Randomized controlled trials on PCOS patients show that acupuncture can significantly reduce androgen levels, raise ovulation rate and improve fertility <sup>[23]</sup>. Moreover, acupuncture can regulate the hypothalamic-pituitary-ovarian axis to restore ovarian function, thus exerting a positive impact on the pathological process of PCOS <sup>[24]</sup>. The results of evidence-based analysis further validate the effectiveness of acupuncture as an adjuvant therapy for PCOS.

## **2.4. Comparative study on hormonal therapy and TCM**

### **2.4.1. Efficacy comparison: Pregnancy rate and menstrual regularity**

Comparing the efficacy of hormonal therapy and TCM in terms of pregnancy rate and menstrual regularity is an important research direction. Hormonal therapy is generally recognized as an effective intervention to improve fertility, especially for PCOS patients complicated with other endocrine disorders. Studies indicate that hormone replacement therapy can effectively regularize menstrual cycles and increase pregnancy rates <sup>[25]</sup>. Meanwhile, TCM also achieves good results, especially in regulating menstruation and promoting ovulation. Systematic reviews demonstrate that TCM therapies based on the theories of tonifying the kidney and regulating liver exert prominent clinical effects on women with diminished ovarian reserve and can increase pregnancy rates <sup>[26]</sup>. In addition, relevant studies on PCOS confirm that TCM has satisfactory efficacy in relieving irregular menstruation and increasing ovulation frequency <sup>[27]</sup>. In summary, hormonal therapy and TCM have their respective advantages. Hormonal therapy may produce more rapid effects in the short term, while TCM shows unique value in relieving symptoms and treating patients with poor or no response to hormonal therapy.

#### **2.4.2. Safety assessment and adverse reactions**

The comparison of adverse reactions and safety is equally important. Hormonal therapy is often accompanied by side effects such as weight gain, mood swings and breast distending pain, which compromise patients' quality of life <sup>[28]</sup>. In addition, long-term use of hormones may increase the risks of cardiovascular diseases and malignant tumors, including breast cancer <sup>[29]</sup>. In contrast, TCM is generally considered relatively safe with fewer adverse reactions. Research shows that TCM rarely causes severe adverse events when applied to treat menstrual disorders and infertility <sup>[30]</sup>. The combined therapy of Chinese herbal medicine and acupuncture can effectively relieve symptoms with minimal side effects <sup>[31]</sup>. Nevertheless, the efficacy and safety of TCM are affected by individual physical differences and specific treatment regimens. Therefore, multiple factors should be taken into careful consideration when selecting treatment plans.

### **2.5. Therapeutic recommendations under the framework of evidence-based medicine**

#### **2.5.1. Significance of individualized treatment strategies**

Individualized treatment strategies have gained increasing attention in modern medicine, especially for chronic and complex diseases. By comprehensively taking patients' genetic background, lifestyle, medical history and treatment response into account, clinicians can formulate more precise treatment regimens. Studies have shown that individualized medication can significantly reduce the incidence of complications and improve patients' quality of life <sup>[32]</sup>. Meanwhile, the hormonal treatment strategies for non-binary patients also prove the necessity of individualized therapy, which can not only improve patients' physical conditions but also promote their mental health <sup>[33]</sup>. The implementation of individualized treatment relies on an in-depth understanding of patient characteristics and continuous monitoring of treatment outcomes, which provides an important basis for future treatment plans. Therefore, individualized treatment strategies can not only enhance therapeutic efficacy but also reduce unnecessary adverse reactions, representing an important development trend of modern medicine.

#### **2.5.2. Multidisciplinary collaboration and comprehensive treatment**

Multidisciplinary collaboration presents remarkable advantages in the treatment of complex diseases, especially for cancers, cardiovascular diseases and chronic illnesses. A medical team integrating professional knowledge and skills from different disciplines can formulate more comprehensive treatment plans. Multidisciplinary teamwork ensures that patients receive all-around care during treatment <sup>[34]</sup>. This model improves the efficiency of medical services and optimizes patients' medical experience, making them feel more care and supported in the course of complex treatment. Hence, multidisciplinary collaboration is the key to realizing comprehensive treatment under the framework of evidence-based medicine, and can provide safer and more effective treatment regimens for patients.

### **3. Conclusion**

This article summarizes the clinical research progress of hormonal therapy and TCM for PCOS treatment, and highlights the importance of evidence-based medicine. Analysis of existing studies reveals that the two therapeutic approaches present distinct efficacy in different patient groups. This reminds clinicians that individualized demands of patients must be considered to achieve optimal therapeutic outcomes when formulating treatment plans. Hormonal therapy works well in relieving PCOS symptoms, regularizing

menstrual cycles and improving fertility, and is particularly suitable for patients with predominant hormonal imbalance. However, some patients may have a poor response or even discomfort due to the side effects of hormones or individual sensitivity to hormones. In such cases, the advantages of TCM become prominent. By regulating Yin-Yang and unblocking Qi and blood, TCM provides an alternative therapeutic approach for patients.

From the perspective of evidence-based medicine, the combined treatment integrating modern Western medicine and traditional Chinese medicine can better meet diverse clinical demands. Future research should pay more attention to the assessment of individual differences among patients and explore the application potential of combined therapies. Through collecting and analyzing large-scale clinical data, we can clearly clarify the treatment response of different patient groups and further guide the development of individualized treatment.

In conclusion, treatment strategies based on evidence-based medicine can improve the quality of life of PCOS patients and point out valuable directions for subsequent research. The necessity of conducting multi-center clinical trials and prospective studies is self-evident. Only through continuous integration and innovation can we provide safer and more effective treatment options for PCOS patients and achieve better therapeutic effects.

## Disclosure statement

The authors declare no conflict of interest.

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