

**METABOLIC IMPLICATIONS OF POLYCYSTIC OVARY SYNDROME:
THE ROLE OF INSULIN RESISTANCE AND CENTRAL OBESITY**

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Abstract. Polycystic ovary syndrome (PCOS) significantly increases the risk of metabolic syndrome (MetS), requiring early detection of insulin resistance and central obesity for effective prevention [1]. A cross-sectional study found that IDF criteria offer superior sensitivity over ATP III for diagnosing early metabolic abnormalities, with HOMA-IR and waist circumference as key indicators [1]. For more details, visit the study's abstract.

Introduction

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders affecting women of reproductive age. Traditionally associated with reproductive dysfunction, PCOS is now increasingly recognized as a systemic condition with significant metabolic implications. Insulin resistance plays a central role in its pathogenesis and contributes to the development of metabolic syndrome (MetS), a cluster of risk factors that includes abdominal obesity, hyperglycemia, dyslipidemia, and hypertension [2].

Despite the well-established association between PCOS and metabolic abnormalities, early diagnosis of metabolic syndrome in these patients remains challenging. Standard diagnostic criteria may not fully capture early metabolic disturbances, particularly in young or non-obese individuals. Therefore, optimizing

diagnostic strategies is essential for timely intervention and prevention of long-term complications such as type 2 diabetes and cardiovascular disease[3].

Materials and Methods

This cross-sectional study included 120 women aged 18–40 years. The main group consisted of 80 patients diagnosed with PCOS based on the Rotterdam criteria (presence of at least two of the following: oligo/anovulation, hyperandrogenism, polycystic ovarian morphology). The control group included 40 healthy women without endocrine or metabolic disorders.

All participants underwent standardized clinical and laboratory evaluation. Anthropometric measurements included body mass index (BMI) and waist circumference (WC). Venous blood samples were collected after overnight fasting to measure plasma glucose, insulin levels, and lipid profile (total cholesterol, triglycerides, LDL-C, HDL-C).

Insulin resistance was estimated using the Homeostasis Model Assessment (HOMA-IR). Metabolic syndrome was diagnosed according to the criteria of the International Diabetes Federation (IDF) and the National Cholesterol Education Program Adult Treatment Panel III (ATP III)[4].

Statistical analysis was performed using appropriate software. Continuous variables were expressed as mean \pm standard deviation. Group comparisons were conducted using Student's t-test, while categorical variables were analyzed using the chi-square test. Correlation analysis was applied to assess relationships between variables. A p-value <0.05 was considered statistically significant.

Results

The analysis revealed a significantly higher prevalence of metabolic syndrome among women with PCOS compared to the control group. A substantial proportion of PCOS patients exhibited insulin resistance, as indicated by elevated HOMA-IR values.

Central obesity, reflected by increased waist circumference, was one of the most common findings and showed a strong association with other components of metabolic syndrome. Dyslipidemia, particularly elevated triglycerides and reduced HDL cholesterol levels, was also frequently observed.

Comparative evaluation of diagnostic criteria demonstrated that the IDF definition identified a greater number of patients with early metabolic abnormalities than the ATP III criteria. Correlation analysis confirmed a strong relationship between insulin resistance, waist circumference, and the presence of metabolic syndrome.

The findings of this study support the growing body of evidence that PCOS is closely linked to metabolic dysfunction. Insulin resistance appears to be the key underlying mechanism connecting reproductive and metabolic abnormalities in these patients.

The results also highlight the limitations of traditional diagnostic criteria when applied to PCOS populations. The higher sensitivity of the IDF criteria suggests that incorporating central obesity as a mandatory component may improve early detection.

Furthermore, the strong association between HOMA-IR and metabolic syndrome emphasizes the importance of including insulin resistance assessment in routine clinical practice. Early identification of high-risk patients enables timely lifestyle and pharmacological interventions.

Conclusion

Women with PCOS have a significantly increased risk of developing metabolic syndrome. A diagnostic approach that integrates anthropometric measurements and insulin resistance markers provides a more accurate and clinically relevant assessment.

Routine evaluation of waist circumference and HOMA-IR is recommended to enhance early detection and improve long-term outcomes in this population.

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