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Assessment of adipokines and cytokines as predictive biomarkers for metabolic syndrome in polycystic ovary syndrome patients

Background. Polycystic ovary syndrome (PCOS) is a multifactorial endocrine condition that affects roughly 10-15% of women of reproductive age, and one of the most frequent ovarian pathologies in the world.
Aim: to determine the predictive value of adipokines and inflammatory cytokines as predictive biomarkers of metabolic syndrome in women with PCOS.
Materials and methods. The cross-sectional research was performed from 10 January 2025 to 15 November 2025, involved 100 women (75 PCOS, 25 controls). Qualified participants consisted of healthy 18 to 40 years old women. Adipokines and cytokines in blood samples were determined by ELISA during fasting, lipid profile was determined by spectrophotometry, and glucose was determined by spectrophotometry. Waist circumference, blood pressure and BMI were evaluated and metabolic syndrome was harmonized as defined.
Results. The patients of PCOS had a high BMI, waist circumference, blood pressure, and fasting glucose relative to controls and a low level of HDL-C. The components of metabolic syndrome were significantly higher in PCOS, particularly, central obesity and dyslipidemia. Adiponectin was low, whereas, leptin, TNF-a, and IL-6 were highly increased in PCOS with MetS. These biomarkers were strongly correlated with metabolic parameters and logistic regression found low adiponectin, high leptin, TNF- a, IL-6 and high BMI as significant predictors of metabolic syndrome.
Conclusion. The imbalance of adipokines caused by obesity and the high level of inflammatory cytokines are essential factors that contribute to metabolic syndrome in PCOS. Low adiponectin and high leptin, TNF-A, and IL-6 are known to interfere with insulin signaling and lipid metabolism, which is why they are very predictive of metabolic deterioration.
Keywords: Polycystic Ovary Syndrome, Metabolic Syndrome, Adipokines, Cytokines, Biomarkers.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is among the most frequent endocrine and metabolic disorders of women of reproductive age and when identified globally, its prevalence is between 6 and 20 per cent, depending on diagnostic criteria and the population under investigation. PCOS is a hyperandrogenic, ovulatory dysfunctional, and polycystic ovarian morphology disorder, which is becoming increasingly understood as a complicated systemic disorder that goes way beyond reproductive abnormalities [1]. The percentage of PCOS women experiencing metabolic imbalances such as insulin resistance, dyslipidemia, obesity and high blood pressure are indicative of a spectrum of similarities with metabolic syndrome (MetS).

MetS is a group of interrelated metabolic abnormalities that in combination lead to an increased risk of type 2 diabetes mellitus, cardiovascular disease and chronic inflammatory conditions. The clinical implications of PCOS and MetS coexistence are significant because women with a combination of PCOS and MetS have worse metabolic and cardiovascular risks in comparison to women with PCOS [2,3]. Recent findings indicate that the key mechanisms of association between PCOS and metabolic imbalances are low-grade chronic inflammation and dysfunction of adipose tissue.

Adipose tissue is now being considered an active endocrine gland that secretes diverse bioactive molecules together in one group known as adipokines [4].

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