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C-Reactive Protein Levels in Polycystic Ovarian Syndrome: A Marker of Inflammation and Cardiometabolic Risk: An Analytical Study in India

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Abstract

Background: Polycystic ovarian syndrome (PCOS) is associated with metabolic abnormalities and increased cardiovascular risk. Chronic low-grade inflammation has been implicated in its pathogenesis. C-reactive protein (CRP) is a sensitive marker of systemic inflammation and cardiometabolic risk.

Objectives: To compare serum C-reactive protein levels in women with PCOS and healthy controls and to evaluate its association with cardiometabolic risk factors.

Methods: This analytical case-control study included 70 women with PCOS diagnosed using Rotterdam criteria and 65 age-matched healthy controls (18–35 years). Serum CRP was measured by immunoturbidimetric assay. Anthropometric parameters were recorded. Data were analyzed using Student's t-test and Pearson correlation. A p-value <0.05 was considered statistically significant.

Results: Mean serum CRP levels were significantly higher in the PCOS group compared to controls (1.97 ± 2.26 mg/L vs 0.26 ± 0.40 mg/L; $p < 0.001$). CRP showed a positive correlation with body mass index (BMI) ($r = 0.42$, $p < 0.01$).

Conclusion: Elevated CRP levels in women with PCOS indicate chronic inflammation and increased cardiometabolic risk. CRP may serve as a useful marker for early cardiovascular risk assessment in PCOS.

Keywords: Polycystic ovarian syndrome, C-reactive protein, inflammation, cardiometabolic risk

Introduction

Polycystic ovarian syndrome (PCOS) is one of the most prevalent endocrine disorders affecting women of reproductive age. Apart from reproductive dysfunction, PCOS is associated with insulin resistance, obesity, dyslipidemia, and increased cardiovascular risk. Recent studies suggest that chronic low-grade inflammation plays a key role in the pathophysiology of PCOS.

C-reactive protein (CRP), an acute-phase inflammatory marker, is an independent predictor of cardiovascular disease. Elevated CRP levels in PCOS may reflect increased inflammatory activity contributing to cardiometabolic complications. This study aimed to evaluate serum CRP levels in women with PCOS in an Indian population.

Materials and Methods

Study Design and Participants

An analytical case-control study was conducted in the gynecology outpatient department of a tertiary care hospital in India.

Cases: 70 women diagnosed with PCOS based on Rotterdam criteria

Controls: 65 age-matched healthy women with regular menstrual cycles

Inclusion Criteria

Women aged 18–35 years

Confirmed diagnosis of PCOS (cases)

Exclusion Criteria

Pregnancy

Diabetes mellitus

Cardiovascular disease

Acute or chronic inflammatory conditions

Use of hormonal or anti-inflammatory drugs

Laboratory Analysis

Fasting venous blood samples were collected. Serum CRP levels were estimated using an immunoturbidimetric assay.

Statistical Analysis

Data were expressed as mean ± standard deviation. Student's t-test was used to compare groups, and Pearson's correlation coefficient was applied to assess associations. A p-value <0.05 was considered statistically significant.

Ethical Clearance

The study protocol was reviewed and approved by the Institutional Ethics Committee of the participating institution. Written informed consent was obtained from all participants prior to enrollment. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

Results

Table 1. Baseline Characteristics of Study Participants

PCOS Group (n = 70)

Control Group (n = 65)

Parameter

p-value

Age (years)

26.4 ± 4.2

25.9 ± 3.8

>0.05

BMI (kg/m²)

27.1 ± 3.9

22.8 ± 2.6

<0.01

Table 2. Comparison of Serum C-Reactive Protein Levels
Parameter
PCOS Group
Control Group
p-value
CRP (mg/L)
1.97 ± 2.26
0.26 ± 0.40
<0.001
Women with PCOS demonstrated significantly higher serum CRP levels compared to controls.
Table 3. Correlation of CRP with BMI in PCOS Group
Correlation Coefficient (r)
Variable
p-value
CRP vs BMI
0.42
<0.01
A significant positive correlation was observed between CRP levels and BMI among women with PCOS.
Discussion
The present study demonstrates significantly elevated CRP levels in women with PCOS, indicating the presence of chronic low-grade inflammation. Increased BMI and metabolic disturbances may contribute to elevated inflammatory markers. These findings align with previous Indian and international studies highlighting inflammation as a central component of PCOS.
Chronic inflammation may promote endothelial dysfunction and atherosclerosis, thereby increasing cardiometabolic risk in women with PCOS. CRP estimation may therefore be useful in early identification of individuals at risk.

Conclusion
Women with PCOS exhibit significantly higher serum CRP levels compared to healthy controls, reflecting a chronic inflammatory state and increased cardiometabolic risk. CRP can serve as a simple and cost-effective marker for cardiovascular risk assessment in PCOS.

References (sample)
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