|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||

Available online on http://www.ijmbs.info

International Journal of Medical and Biomedical Studies; 2025; 9(4); 1-6

Original Research Article

Serum ghrelin levels in PCOS and its relation with HOMA-IR

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Received: 14-04-2025 / Revised: 14-05-2025 / Accepted: 26-06-2025
DOI: https://doi.org/10.32553/ijmbs.v9i4.3077
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Conflict of interest: No conflict of interest

Abstract:

Background: To investigate the level of Ghrelin in PCOS patients and compare with controls and also see the correlations between the serum Ghrelin levels and HOMA-IR.

Patients and methods: We analyzed 35 patients with PCOS and 35 normal women as controls. Serum Ghrelin levels and Insulin Homeostasis Model Assessment for Insulin Resistance (HOMA-IR) were determined and compared with controls.

Results: Serum Ghrelin levels were significantly lower in PCOS group than controls.

Introduction

Polycystic Ovary Syndrome (PCOS) is currently recognized as one of the most commonly encountered endocrine disorders affecting women during their reproductive years. It has a global prevalence, with certain studies reporting rates as high as 15–20% among specific populations (1–3). PCOS is a heterogeneous and complex disorder, considered a genetic trait with multifactorial etiology involving both genetic predisposition and environmental influences (4). It is a multifactorial endocrine disorder affects an estimated 5% to 10% of women of reproductive age (12 to 45 years). It is a leading cause of anovulatory infertility and is associated with various metabolic abnormalities, including insulin resistance, dyslipidemia, obesity, and increased risk for type 2 diabetes mellitus. Despite extensive research, the underlying causes of PCOS remain incompletely understood. However, genetic tendency is believed to play a major role in its development (5,6).

PCOS is characterized by three primary clinical features:

- Anovulation, leading to irregular menstruation, amenorrhea, and ovulation-related infertility.
- Hyperandrogenism, resulting in hirsutism, acne, and other androgenic symptoms.
- Insulin resistance, which is strongly associated with obesity and metabolic syndrome.

Insulin resistance is a particularly significant component, contributing not only to metabolic dysfunction but also to the reproductive symptoms of PCOS through increased androgen production and disrupted ovarian function (7,8). Hyperinsulinemia is observed and may contribute to anovulation. Elevated insulin levels can promote premature maturation of

granulosa cells, inhibit their proliferation, and disrupt follicular development, especially in the presence of heightened luteinizing hormone (LH) concentrations (9). The expression of symptoms and severity of PCOS can vary widely among affected women, highlighting the heterogeneity of the syndrome.

Reports indicate that approximately 35% to 80% of women diagnosed with PCOS are either overweight or obese (10–13). Nevertheless, obesity is not a universal characteristic of the syndrome, as a substantial proportion of women with PCOS are of normal weight or lean (14–15). Furthermore, PCOS has been linked with an increased incidence of metabolic conditions such as type 1 and type 2 diabetes mellitus, as well as gestational diabetes (16).

Ghrelin is a peptide hormone with orexigenic properties predominantly secreted by ghrelin-producing cells in the gastrointestinal tract. It , plays a crucial role in stimulating growth hormone secretion and regulating glucose metabolism, appetite, body weight, and various pancreatic, endocrine, and ovarian functions (17–19) and functions as a neuropeptide within the central nervous system and plays a vital role in hunger regulation and energy balance (20,21). Ghrelin and its receptor (GHS-R1a) are involved in complex energy regulation mechanisms, such as energy homeostasis (22). Notably, ghrelin acts on the same hypothalamic neurons that express leptin receptors. Leptin, often referred to as the "satiety hormone," exerts effects opposite to those of ghrelin (23). Emerging evidence suggests a possible role for ghrelin in reproductive physiology. Ghrelin receptors have been identified in ovarian tissue, indicating that the hormone may influence ovarian function (24). In the context of PCOS, ghrelin levels have been observed to be reduced, particularly in association with increased body mass index (BMI), with studies showing a negative correlation between BMI and ghrelin levels (25). In women with PCOS, altered ghrelin levels may influence insulin resistance and androgen levels, potentially exerting a detrimental effect on fertility (26). This connection raises the possibility that ghrelin may serve as a link between metabolic status and reproductive health.

Methods

We analyzed 35 patients with PCOS and 35 normal women as controls. Serum Ghrelin levels and Insulin Homeostasis Model Assessment for Insulin Resistance (HOMA-IR) were determined and compared. Women were recruited from the department of Obstetrics and Gynecology Rajkiya Mahila Chikitsalaya, Ajmer.

Exclusion Criteria

1. Patients with Diabetes Mellitus.
2. Patients with Hepatic and Renal dysfunction.
3. Patients with Thyroid dysfunctions.
4. Pregnant women.
5. Patients with Cardiovascular disease.

Biochemical Parameters:

Following Estimations Will Be Carried out

Serum Ghrelin- ELISA method.

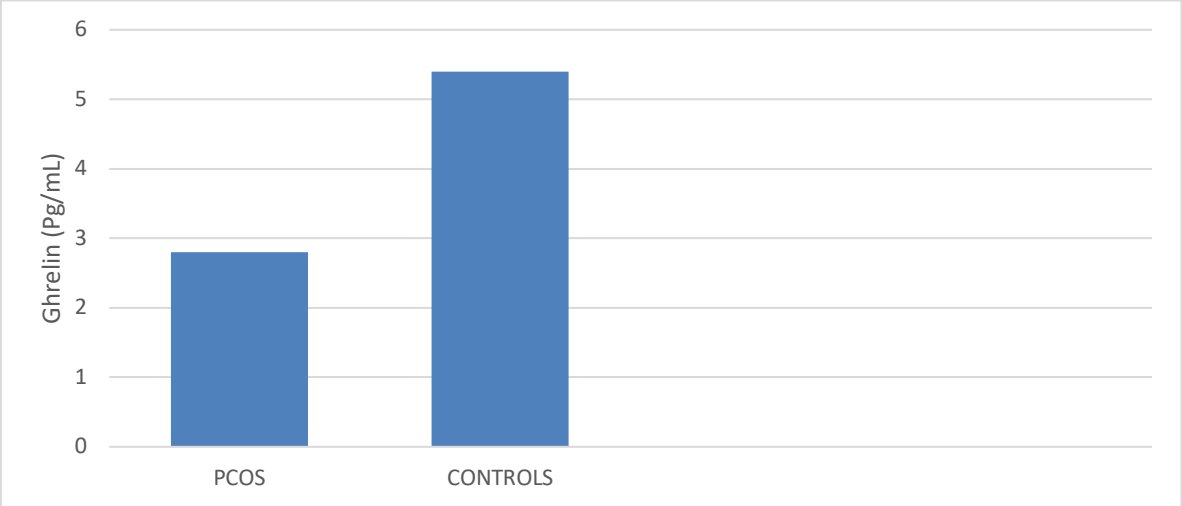
Insulin resistance calculated by using Homeostasis model Fasting plasma glucose [mmol/L] X Fasting insulin [mU/L]/22.5

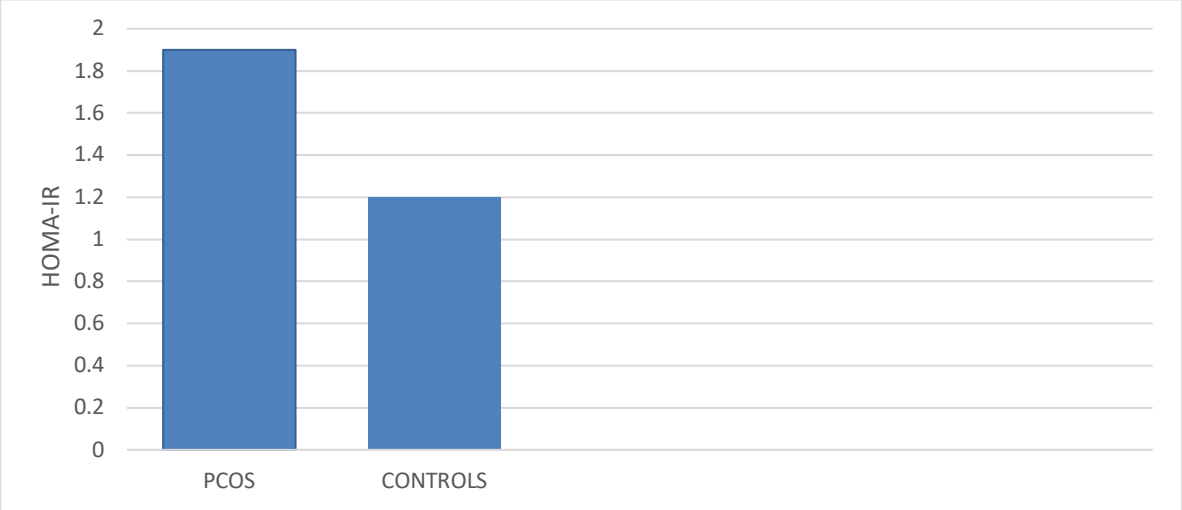
Results

Serum Ghrelin levels were significantly decreased in PCOS patients when compared to controls. Ghrelin was negatively correlated with HOMA-IR in PCOS patients with reference range of Ghrelin being 0.6-40.0 Pg/mL.

Levels of Ghrelin and Homa-IR in PCOS and its Comparison with Control

	PCOS	CONTROL
Ghrelin	2.8	5.4
HOMA-IR	1.9	1.2





Discussion

PCOS has been recognised as the most frequent endocrinopathy among reproductive aged women with a prevalence of 5-18% worldwide. The phenotype varies according to ethnicity, genotype life stage, lifestyle, and environmental factors.

PCOS is often associated with a number of cardiometabolic disorders such as obesity, dyslipidemia, hypertension, insulin resistance hyperinsulinemia, glucose intolerance, and type-2 diabetes mellitus.

In the current study, we correlate the serum levels of Ghrelin with insulin resistance in polycystic ovary disease, through the estimation of serum levels of Ghrelin and other metabolic and hormonal parameters in women with PCOS and healthy controls.

In the present study women with PCOS have a significantly lower level of Ghrelin as compared to healthy subjects. We also found significantly higher level of HOMA-IR, testosterone, CRP, and blood pressure in PCOS women as compared to healthy women.

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