



Article

Evaluating The Levels of Asprosin and Galanin-Like Peptide as Biochemical Markers for Patients with Polycystic Ovarian Syndrome

Marwan Azeez Hasan^{*1}

1. General Directorate of Education of Salah Al-Din, Ministry of Education

*Correspondance: zyz620761@gmail.com

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Abstract: A prevalent endocrine condition that affects women of reproductive age is polycystic ovarian syndrome, or PCOS. New research suggests the protein asprosin, released during a state of fasting, could be important to the disease's mechanisms. Additionally, galanin-like peptides (GALP) are associated Considering human insulin sensitivity and body mass index (BMI). These peptides boost insulin signaling by influencing insulin receptors in adipose tissue, skeletal muscles, and the liver. The objective of the study was to measure the levels of Asprosin and galanin-like peptide in serum samples from women who have been diagnosed with polycystic ovarian syndrome (PCOS) and those who have not. The purpose was to explore their possible involvement in metabolic and hormonal changes of PCOS. The study was a cross sectional study and was performed at the Salahadeen General Hospital's Gynecology and Obstetrics Department for six months, from December 1, 2025, to June 30, 2026. One hundred women between the ages of 15 and 45 who had been diagnosed with PCOS were chosen as a suitable sample. According to this study, the two groups' metabolic indicators differed significantly. Specifically, compared to women in the control group, women with PCOS exhibited significantly lower ($p<0.001$) serum galanin-like peptide concentrations. The results showed the mean $\pm$ SD of the PCOS group's serum levels of galanin-like peptide. Additionally, compared to the controls, women with PCOS had considerably higher levels of asprosin ($p<0.001$). These results suggest a potential link between these biomarkers and the hormonal and metabolic abnormalities seen in PCOS.

Keywords: Polycystic Ovary Syndrome (PCOS), Galanin-Like Peptide, Asprosin, Metformin, Biochemical Markers

1. Introduction

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in women [1]. While PCOS is prevalent, it is not considered to be "normal, it can be challenging to diagnose and treat, because the primary symptoms of the condition differ from one person to the next depending on age and require individual treatment plans to manage. Infertility in women with PCOS is estimated to be 70% - 80% of all cases of anovulatory infertility. But the effects of PCOS are no limited to the reproductive aspect; it can also have health implications that can lead to serious and life threatening situations [2].

However, women with PCOS frequently have a variety of comorbidities that impact on different aspects of their health. These can include psychological issues, including anxiety and depression, body image disorder, metabolic issues such as obesity, insulin resistance, metabolic syndrome, diabetes (type 2 and prediabetes), high blood pressure and abnormal lipid profile. In addition, they are more likely to get other diseases such as sleep apnea, endometrial cancer and pregnancy complications [3]. Gestational diabetes, pregnancy induced hypertension, preeclampsia, postpartum hemorrhage & infection, stillbirth, operative delivery, shoulder dystocia, and meconium aspiration are some of the complications [4].

In animals, galanin-like peptides (GALP) have been suggested as a connection between metabolic status and the neural network involved in the synthesis and release of GnRH. Recently discovered in the arcuate nucleus (ARC) of hypothalamus this hypothalamic peptide is able to activate GnRH production in both the hypothalamus and GT1-7 cells. GALP is an important neuropeptide involved in appetite regulation, energy expenditure and body weight [5].

PCOS is a chronic endocrine and metabolic disorder that is primarily linked with insulin resistance and metabolic abnormalities, although its specific pathogenesis is not fully understood. Early detection and timely intervention is crucial for enhancing the quality of life for patients and postponing complications associated with the disease [6]. So that is why this study decided to concentrate on the levels of Galanin-like peptide (GALP) in the blood of PCOS patients. Moreover, it investigated the correlations between GALP levels, sex hormones and metabolic parameters to help improve the evaluation, diagnosis and management of PCOS [7].

White adipose tissue secretes Asprosin, a peptide hormone that is important for promoting glucose output from the liver. In recent studies, it was discovered that the levels of asprosin are high in people affected by type 2 diabetes than in people who are not affected [8]. Further, asprosin levels are directly correlated with insulin resistance. The identification of asprosin is a significant step in the field of metabolic disease research for treatment of insulin resistance-related conditions. Recent research suggests asprosin plays an important and complex role in metabolism and metabolism-related diseases [9].

Aim of the Study

The aim of this study is to Investigating insulin resistance with asprosin and galanin-like peptide in polycystic ovary.

2. Materials and Methods

Study Design

The cross-sectional study was conducted from 1st December 2025 to 30th June 2026 at Salahadeen General Hospital. Collection and Storage of Blood Samples: About 5 ml of blood was collected from Participants through venous puncture and stored in the laboratory. The blood was transferred to a sterile tube The serum was prepared by letting it coagulate at room temperature for 10-15 minutes, followed by a 10 minute centrifugation at 3000 rpm. The serum was split into three clear dry Eppendorf tubes, each of which was clearly marked, and kept at -20 °C until further analysis. A convenient sample of 100 women aged 15-45 years was studied who had been diagnosed with PCOS according to the Rotterdam criteria. Oligo- and/or anovulation 2. Clinical and/or biochemical evidence of hyperandrogenism that increases 4. Polycystic ovarian morphology (PCOM) refers to 12 or more follicles that are 2-9 mm in diameter, as measured by transvaginal or abdominal ultrasound and/or an ovarian size of 10 mL or greater in at least one ovary. A clinical examination was conducted to detect signs of PCOS including an increase in body hair around the chest, stomach and back, weight gain, particularly around the abdomen, acne or oily skin, male-pattern baldness or thinning hair, skin tags on the neck/armpits, and dark or thickened skin patches on the neck, armpits and under the breasts. A radiologist

in the Radiology Department of Salahadeen General Hospital and a private clinic in Salahadeen did ultrasound examinations.

Methods

Measurement of the Height and Weight

Body Mass Index (BMI) is a decision-making tool to measure the level of obesity in a population. The weight and height of each patient were measured and body mass index (BMI) was calculated based on the following formula:

$$\text{BMI} = \text{Weight (kg)} / \text{Square height (m}^2\text{)}$$

Thus, the BMI was categorized in to four categories as follows [10]:

Underweight – BMI < 18.5 Kg/m²

Normal weight: BMI is 18.5 Kg/m² to 24.9 Kg/m²

Overweight: BMI (body mass index) is from 25 to 29.9 kg/m²

Overweight: BMI is 25-30 Kg/m².

Measurement of Serum Human asprosin and galanin-like peptide Immunoassay Kit Company (Elkbiotech) and Manufacture Country (China), as well as Insulin Kit Company (Roche Diagnostics GmbH) and Manufacture Country (Germany). As well as *Determination of All the biochemical parameter: LH, FSH, TESTERON and Insulin measure by Elisa kits* Company (Biotech) and Manufacture Country (China).

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) version 22 and Microsoft Excel 2019 were used to enter and analyze the data. Descriptive analysis was based on frequencies and percentages. All continuous variables were reported as mean ± SD. The statistical differences among the study groups were assessed by using the t-test and Chi-Square test, and the P value < 0.05 was considered statistically significant.

3. Results

The study comprised 100 women in total, with an average age range of 15 to 25 years. The minimum age of participants was 15, representing 15% of the group, while the maximum age was 40, accounting for 42%. The majority of participants (75%) resided in urban areas, and 90% were married, as detailed in Table 1.

Table 1. Sociodemographic characteristics of the patients

Sociodemographic characteristics		N (%)
Age (years)	15-25	15 (15.0)
	25-30	25 (25.0)
	30-40	42 (42.0)
	>45	18 (18.0)
Residency	Urban	75 (75.0)
	Rural	25 (25.0)
Marital state	Married	90 (90.0)
	Unmarried	10 (10.0)

As shown in table 2, the abnormal results for LH, FSH, testosterone, and insulin were observed in 43%, 55%, 65%, and 52% of cases, respectively

Table 2. Incidence of abnormal investigations among participants

Investigations	Normal results	Abnormal results	Mean $\pm$ SD
	N (%)	N (%)	
LH	57 (57.0)	43 (43.0) **	9.42 $\pm$ 1.3
FSH	45 (45.0)	55 (55.0) *	6.98 $\pm$ 1.2
Testosterone	35 (35.0)	65 (65.0) *	0.65 $\pm$ 3.8
Insulin	52 (52.0)	48 (48.0) **	12.43 $\pm$ 2.09

*Elevated, **Decreased

Relation of BMI to polycystic ovary syndrome (PCOS)

Table 3 shows how women with polycystic ovary syndrome (PCOS) are distributed across BMI categories of these, 5% were underweight (BMI < 18.5), 15% fell into the normal weight range (BMI 18.5–24.9), 42% were overweight (BMI 25–29.9), and 38% were categorized as obese (BMI $\geq$ 30).

Table 3. Investigate how the number of cases of polycystic ovary syndrome (PCOS) relates to BM

BMI (Kg/m ²)		Studied group
		polycystic ovary syndrome (PCOS)
Underweight (<18.5)	n	5
	%	5%
Normal weight (18.5 – 24.9)	n	15
	%	15%
Overweight (25 – 29.9)	n	42
	%	42%
Obese ($\geq$ 30)	n	38
	%	38%
Total	n	100

A comparison of metabolic biomarkers between the Polycystic Ovary Syndrome (PCOS) group and the control group is presented in Table 4. It provides the mean $\pm$ SD for serum levels of Galanin-like peptide, which reveals a significant decrease ($p < 0.001$) in the PCOS group relative to the controls. Furthermore, women with PCOS exhibited significantly higher Aspersin levels ($p < 0.001$) than those in the control group.

Table 4. Comparison of Metabolic Biomarkers between Groups (Women with PCO, and Control)

Metabolic Biomarkers	Women with PCO (Mean $\pm$ SD) n=100	Control (Mean $\pm$ SD) n=50	F-Test	p-value (S or N.S)
Galanin-like peptide (pg/mL)	40.5 $\pm$ 16.4	52.5 $\pm$ 13.3	0.64	<0.001 ^(H.S)
Aspersin (ng/dl)	523.41 $\pm$ 109.16	319.75 $\pm$ 89.42	28.64	<0.001 ^(H.S)

4. Discussion

In this study, most patients (88%) had normal FSH levels while most (41%) had normal LH levels. LH and FSH were also seen to be significantly different among those classified as normal weight, overweight and obese. The results of this study were consistent with the results of the study conducted in Iraq by Al-anii et al. which revealed that there is a notable disparity in FSH levels between women with PCOS who are obese and those who are not [11]. In another study, performed by Büyükyilmaz et al. in Turkey, they revealed the LH and FSH levels of the patients with a PCOS were significantly different based on the weight of the patients [12].

This study's main conclusion was that the majority of patients carried excess weight or obese. In his study in Iraq, Al-Faisal discovered that women suffering from PCOS have higher BMI levels than healthy women [13]. Another study from 2023 indicates that insulin resistance is found in 40% and 37% of the Iraqi PCOS patients who are obese and overweight, respectively [14]. This is consistent with Barber's study, which revealed that 38%-88% of women who suffer from PCOS are overweight or obese [15]. On the other hand, Ezech et al's research in the USA found that those women with PCOS had significantly higher BMI than the general population [16]. Sachdeva et al. conducted a study and showed that 75.61% of the people with PCOS were either overweight or obese [17]. Galanin is a bioactive material which has been involved in significant roles in the regulation of hunger, obesity, dyslipidemia, insulin resistance, hypertension, metabolic syndrome and reproductive health. The elevated level of Galanin has been associated with polycystic ovarian syndrome (PCOS) and could be a biomarker for cardiovascular diseases [18].

In patients with obesity, Acar and colleagues [19] found that galanin was positively correlated with insulin resistance and cholesterol. Important, it is recognized that physical activity is a strong stimulator of galanin secretion. A study by Fang et al. showed that the galanin system plays a major role in the alleviation of insulin resistance that occurs during exercise, thereby enhancing GLUT-4 migration. In addition, a phenomenon that has been identified as galanin resistance, which is a condition of high blood galanin levels with a lack of glucose regulation in diabetic patients has become an important factor in the onset of polycystic ovarian syndrome (PCOS) [20]. On the flip side, galanin tolerance seems to be closely linked with obesity. Nonetheless, the research on galanin levels in patients with PCOS is limited [21]. Baranowska and her teammates found that people with PCOS had higher galanin levels than those in a control group, though the difference did not reach statistical significance. Asprosin contributes to the release of glucose from the liver into the bloodstream, thereby increasing blood glucose levels. This causes an excessive release of insulin to lower the raised blood sugar back to normal [22]. As time goes on, though, problems with the insulin receptors can make it difficult for cells to respond to insulin, which leads to insulin resistance. Also, by stimulating hypothalamic neurons, asprosin

increases appetite and causes weight gain. The blood concentrations of CRP and Asprosin are significantly correlated with each other, and the correlation is positive in people suffering from PCOS [23]. Persistent, mild inflammation plays a key role in PCOS, aggravating both its symptoms and the metabolic issues associated with it. Research has shown asprosin to possess pro-inflammatory properties, which suggests it could contribute to the onset of insulin resistance and ongoing inflammation in PCOS [24].

5. Conclusion

The majority of women with PCOS in this study were of reproductive age and had insulin resistance symptoms. The researchers observed that the women had much lower levels of asprosin and galanin-like peptide than the control group. In addition, the PCOS patients and the controls exhibited a notable disparity in their FSH and LH levels.

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