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Estimating the Concentrations of Some Adipokines and Biochemical Parameters in Women with Polycystic Ovary Syndrome

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Annotation: Endometriosis and polycystic ovarian syndrome (PCOS) are common disorders of the female reproductive system that have a high morbidity rate because they can considerably impair fertility and quality of life. Adipokines, which play a crucial role in energy metabolism, are pleiotropic signaling molecules released by either brown or white adipose cells. Therefore, the goal of the current study was to evaluate the levels of certain adipokines and biochemical markers in women who have polycystic ovarian syndrome. In the labs of the Teaching Azadi Hospital, this study was conducted from June to February 2024. The samples for the study were submitted by 90 women, ages 15 to 45. These samples were divided into the following two groups: Control group: Thirty healthy women's blood samples were collected during the follicular phase of their menstrual cycles. Patient group: Blood samples from 50 PCOS women were

obtained during the follicular phase. The findings showed that the high percentage of PCOS was found in 26-35year group that reach to 46.7%, the average age of women with PCOS was 28.83±4.11 years. Also, it is noted that the group of women who weighed more than 30 kg/m2 had the highest percentage reached 58.9%. Serum levels of adiponectin in individuals with PCOS were significantly (P <0.05) lower (2.74±0.19) than in healthy women (6.21±0.33). PCOS patients' leptin levels were significantly (P <0.05) higher (26.57 ± 2.15) than those of healthy women (9.05 ± 0.26). Chemerin levels in females with PCOS were significantly (P <0.05) higher (21.85 ± 1.62) than in healthy women (4.84 ± 0.52). The study found that polycystic ovarian syndrome (PCOS) in women is strongly correlated with adipokines, and that PCOS is also correlated with body mass index.

Keywords: PCOS, leptin, adipokines, adiponectin.

Introduction

PCOS, or polycystic ovary syndrome, is a diverse condition marked by hyperandrogenism and persistent ovulatory failure. During the reproductive age, it is thought to be the most common cause of irregular menstruation and the most common endocrinological issue affecting women. Up to 25% of women in their reproductive years may be affected with PCOS, according to predictions. Excess testosterone is the primary hormonal issue in PCOS patients, and it may be brought on by other illnesses including obesity and insulin resistance, which are frequently associated with PCOS [1-4]. According to WHO estimates, 116 million women worldwide (3.4%) suffered from PCOS in 2012 [5]. This high prevalence, together with its association with irregular menstruation and ovulation, infertility, hair loss, and metabolic problems, highlights the substantial financial burden of PCOS [6]. The main pathophysiological factors of PCOS include insulin resistance, hyperandrogenism, chronic low-grade inflammation, and hormonal imbalance. These factors hinder folliculogenesis and raise the risk of associated comorbidities such type II diabetes and endometrial cancer. International guidelines state that hyperandrogenism, and anovulation are the three primary criteria used to diagnose PCOS [7]. Geographical location, nutrition and food, socioeconomic level, and environmental contaminants are some of the environmental factors that may be influencing the onset, occurrence, and treatment of PCOS [7,8]. In women with PCOS, adipokines have an impact on endocrine and metabolic signaling. Numerous adipokines have been shown to modify ovarian

steroidogenesis locally or to influence the hypothalamic-pituitary-gonadal axis' control. It has been documented that women with PCOS exhibit dysregulation of adipocyte-secreted adipokines; for example, their serum levels of leptin are higher and adiponectin is lower. The significance of adipokines in PCOS has already been confirmed by recent studies employing various omics techniques, which identified SNPs in adipokines and their receptors as PCOS-susceptibility markers. Additionally, epigenetic modifications passed down from mother to child that alter adipokine expression are gaining attention [9,10]. However, levels of circulating adipokines were the focus of most traditional investigations addressing the role of adipokines in PCOS [11]. Additional research looked at the gene expression of adipokines in PCOS patients' ovaries or their levels in follicular fluid (FF) [12,13]. To clarify the molecular processes behind adipokine action in this illness, in vitro investigations were conducted [14]. Additionally, BAT's function in PCOS pathogenesis and treatment has garnered a lot of interest recently [15]. Therefore, estimating the levels of specific adipokines and biochemical markers in women with polycystic ovarian syndrome was the goal of the current study.

Materials & Methods

Study population

This study was conducted in the labs of the Teaching Azadi Hospital between June and the end of February 2024. For the study, 90 women ranging in age from 15 to 45 gave blood serum samples. These samples were divided into two groups, which are as follows: Group under control: Thirty blood samples from healthy women were collected during the follicular phase of the menstrual cycle. Patient group: 50 PCOS women had blood samples obtained throughout the follicular phase.

Inclusion criteria

Women with PCOS who are married and between the ages of 18 and 30 and do not have cancers of the pituitaries, adrenal glands, reproductive systems, or urinary tracts.

Exclusion criteria

women with pituitary, and reproductive system malignancies, as well as those using antihypertensive medications.

Measurements

- **Adiponectin:** United States Biological Company ELISA kits (My Biosource, USA) were used to assess adiponectin.
- **Leptin:** measuring serum leptin levels with the Leptin (sandwich) Enzyme Immunoassay Kit. This assay is only meant to be used for in vitro diagnosis. This stable phase of ELISA is based on the sandwich concept.
- **Chemerin:** The method used in this ELISA kit (No.: SL0438Hu, SunLong Biotech Co.,LTD) is Sandwich-ELISA. An antibody specific to chemerin has been pre-coated onto the Microelisa stripplate included in this kit. The manufacturer's protocol is followed when adding standards or samples to the proper Microelisa stripplate wells and combining them with the particular antibody.

Statistical analysis

Data was coded and entered into a computer for statistical analysis using the Statistical Package for Social Science (SPSS) application, version 18. Each data point was arranged according to its frequency, and correlations between variables were examined using the Chi-square test. A significant p-value was defined as less than 0.05 [16-17].

Results & Discussion

The high percentage of PCOS was found in 26-35year group that reach to 46.7%. while, the low percentage of PCOS was found in 15-25year group that reach to 23.3%, The average age of women

with PCOS was 28.83±4.11 years, as shown in table (1).

Table (1): Number and percentage of women with PCOS and control according to age

Age (year)	Control (n=60)		Patients (n=90)	
	No.	(%)	No.	(%)
15-25	18	30.0%	21	23.3%
26-35	26	43.3%	42	46.7%
36-45	16	26.7%	27	30.0%
Total	60	100%	90	100%

In this study, Women aged 26–35 years had higher PCOS total scores, and regression analysis showed that the total scores were negatively affected by increasing age. These results contradicted those of [18], who found that the subjects' mean age was 20.4±1.5 years in both groups and that the two groups' baseline general characteristics were comparable ($p>0.05$). The findings ran counter to those of Bronstien et al. [19], who claimed that adolescents accounted for 74% of PCOS cases. Because girls in Iraq may not receive a diagnosis in their early pubertal years, the data showed a high percentage in the 26–35 age group.

Table (2) shows that there is a strong association between obesity and PCOS in women, where it is noted that the group of women who weighed more than 30 kg/m2 had the highest percentage reached 58.9%, while, the low percentage of PCOS was found in 18-24 kg/m^2 group that reach to 11.1%.

Table (2): BMI-based numbers and percentages of women with PCOS and control

BMI (kg/m^2)	Control (n=60)		Patients (n=90)	
	No.	(%)	No.	(%)
18-24 kg/m^2	37	61.7%	10	11.1%
25-30 kg/m^2	14	23.3%	27	30.0%
More than 30 kg/m^2	9	15.0%	53	58.9%
Total	60	100%	90	100%

Our findings are consistent with those of Azzizetal and Diamondrietal, who found that 30–40% of PCOS patients were overweight and obese [20, 21]. Additionally, several studies with BMI-matched PCOS and controls have shown similar results [22,23].

Adiponectin levels in PCOS patients' serum (2.74±0.19) were significantly ($P <0.05$) lower than those of healthy women (6.21±0.33), as indicated in figure (1). Table (3) displays the concentrations of several adipokines in PCOS patients and healthy people. Figure (2) shows that the concentration of leptin was significantly ($P <0.05$) higher in PCOS patients (26.57 ± 2.15) than in healthy women (9.05 ± 0.26). Figure (3) shows that the concentration of Chemerin was significantly ($P <0.05$) higher in PCOS patients (21.85 ± 1.62) than in healthy women (4.84 ± 0.52).

Table (3): the concentrations of some adipokines in studied groups

Groups / Parameter	Control (30)	Women with PCOS (50)	P-Value
Adiponectin (µg/ml)	6.21 ± 0.33	2.74± 0.19*	0.001
Leptin (ng/ml)	9.05 ± 0.26	26.57 ± 2.15*	0.001
Chemerin (pg/ml)	4.84 ± 0.52	21.85 ± 1.62*	0.001

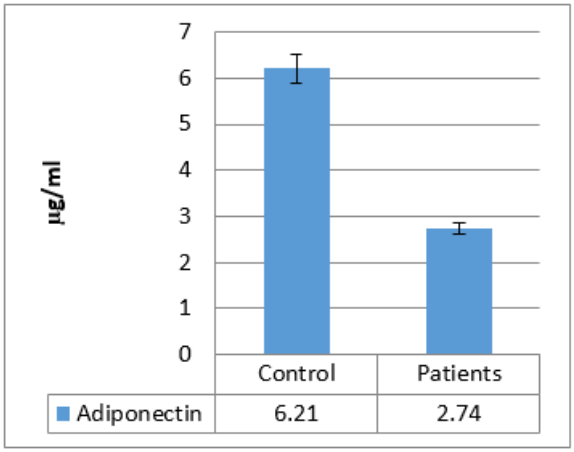

Figure (1): Adiponectin levels in patients and control.

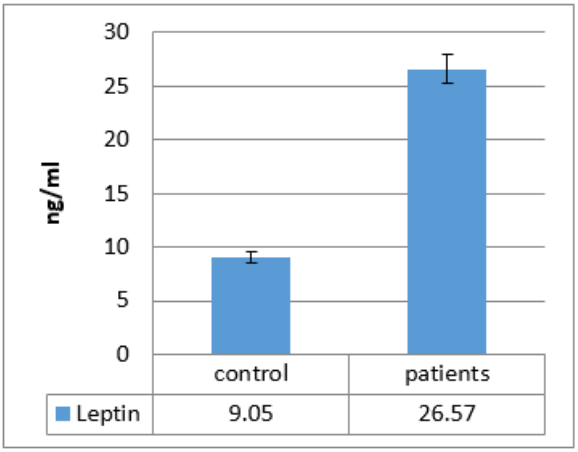

Figure (2): leptin levels in patients and control.

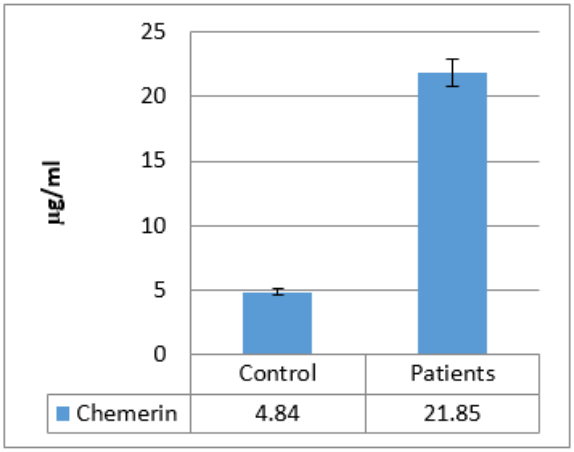

Figure (3): chemerin levels in patients and control.

According to the majority of research, PCOS women had significantly lower adiponectin levels than healthy controls with the same BMI [24]. Adiponectin concentration fluctuates with the degree of obesity and is not impacted by insulin resistance, according to some research, while other studies have linked variations in adiponectin levels to insulin resistance and glucose intolerance [25]. Compared to their obese control group, obese PCOS women in this study had considerably higher leptin levels. According to recent findings, leptin has been linked to PCOS and has provided light on its function [26]. In line with earlier research, this study showed that serum leptin levels were higher in PCOS patients than in the non-PCOS control group. According to certain theories, PCOS-related elevated leptin may disrupt ovarian steroidogenesis and mature oocyte development, resulting in ovulatory dysfunction and infertility [27, 28]. The outcomes were consistent with recent studies [29,30], which found that overweight PCOS patients had significantly higher levels of chemrin than those of normal weight. However, the findings are inconsistent with previous studies [31], Results suggested that there are no appreciable variations in chemerin levels between PCOS patients and healthy women. It has been noted that there are other predicting factors for circulating chemrin besides body mass index. Research has shown that in PCOS, chemrin has a positive correlation with BMI and triglycerides, while there is also an inverse correlation between chemerin and HDL [32].

Conclusions

The study concluded that there is a strong association between adipokines levels and polycystic ovary syndrome in women, and PCOS was also associated with body mass index.

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