Study of some hormonal changes in women with polycystic ovary syndrome in Kirkuk city

Layla Abd-Al-Sattar Sadiq Laylani

Community Health Department, Instituted Kirkuk Technical, Northern Technical University, Iraq.

Abstract: The present study was conducted to find the correlation between certain hormones levels and PCOS. The study used two hundred volunteers (One hundred forty eight with polycystic ovary syndrome and fifty two apparently healthy subjects). Patients were divided to three groups according to their age. The first group was include apparently healthy and patients between 12-21 year, while second group was include age between 22-32 year, the third group was include age 32-41 year. Serological assays showed an increas in LH, Leptin, inhibin b and insulin resistance in all patient groups. Moreover, all parameter levels showed significant increas ($P<0.05$) in all patients compared with all healthy subject groups. While, FSH levels still normal in both groups and there is no significant changes comparing with healthy groups. It was concluded from this study that the polycystic ovary syndrome led to several hormonal changes.

Corresponding author: should be addressed (Email: doctor.layla@yahoo.com)

Introduction

Polycystic ovary syndrome (PCOS), also called hyperandrogenic anovulation (HA), a set of symptoms due to a hormone imbalance in women (1). Polycystic ovary syndrome is characterized by presence of polycystic ovaries on ultrasound together with the clinical (androgenisation: hirsutism, acne with seborrhea, menstrual disorders with anovulation, and infertility) and biochemical signs of hyperandrogenism (2). Although Polycystic ovary syndrome is the most frequent endocrine disorder in women of reproductive age but its diagnosis still one of the most challenging issues in endocrinology and reproductive medicine (3-4). PCOS is the most common endocrine disorder among women between the ages of 18 and 44 years (1). Moreover, Polycystic ovary syndrome is associated with features of the metabolic syndrome (central obesity, high blood pressure, elevated serum triglycerides and impaired glucose tolerance) (5). Although a large body of evidence points out that theca interna cells (TIC) and granulosa cells (GC) dysregulations are the main culprits, oocyte defect(s) may also participate in abnormal folliculogenesis of PCOS (6). Several theories have been proposed to show the pathogenesis of polycystic ovary syndrome like increase in (GnRH) and LH secretion or alteration in insulin secretion lead to hyperinsulinmia and insulin resistance (7). A defect in androgen synthesis that

results in an increased ovaries androgen production was also reported (8, 9). In contrast, secretion of follicle stimulating hormone (FSH) is influenced by a number of regulatory molecules, including GnRH, estradiol, inhibin, and activin (10). The role of leptin in PCOS is unclear, recent studies have had conflicting results. Some studies suggest that leptin is elevated more greatly in women with PCOS when compared to women without the syndrome but in the same weight range (11). The present study was conducted to find the correlation between certain hormones levels and PCOS with different subject ages.

Materials and Methods

Two hundreds volunteers (female) were taken in this study. One hundred and fourty eight with polycystic ovary syndrome and 52 apparently healthy, who randomly selected between November 2014 to March 2016 at Al-Einaya private laboratory in Kirkuk city-Iraq, age group ranging between (12-42 years) according to Kanwar *et al*. (2015) (1), patients with PCOS have increased of body mass index compare with apparently healthy.

In this study, 200 volunteers were used and divided to three groups (according to age) as show in Table 1.

Table (1): The percent of volunteers in each group (PCOS & Control)

Groups	Control	Patient
G1: 12-21 year	38.5%(20)	41.2 %(61)
G2: 22-31 year	32.5%(17)	34.5%(51)
G3: 32-41 year	29 %(15)	24.3/ %(36)

Sample Collections for Serological Analysis

Five ml of venous blood samples were obtained from the volunteers (in the 3rd day of menstrual cycle in both patients and apparently healthy). All blood samples were dispensed into dry glass test tubes for clotting and retraction to take place. Sera were obtained after samples were centrifuged at 5000 round/10 min and and kept frozen at - 20 °C until the time of assay (12).

Methods of Estimation of Hormones Levels

Serum leptin was measured by using (ELISA system,Creative diagnostic (U.S.A)) (13). The determination serum Inhibin B by Enzyme Linked Immunosorbent Assay (ELISA) (RayBiotech, Inc (14). Insulin resistance was measured by using the homeostasis model assessment for IR (HOMA-IR). (HOMA-IR) = [fasting insulin (µU/ml)) × [fasting glucose (mg/dl)) /405 (14). Serum luteinizing hormone (LH), follicle stimulating hormone (FSH) were measured by mini VIDAS methods (16).

Statistical analysis

Data were analyzed using a statistical Minitab program, using Analysis of Variance (ANOVA) test, in order to evaluate the significance of variability between treated and control groups (17).

Results

Leptin and Insulin Resistance

Leptin levels show significant (p<0.05) increasing in patients groups (G1: 18.52 ± 4.78; G2: 18.76 ± 5.11; G3: 21.28 ± 8.5) compare with healthy groups (G1: 4.38 ± 2.01; G2: 2.15 ± 1.84; G3: 5.39 ± 4.24). Insulin resistance levels in patient groups (G1: 19.53 ± 12.45; G2: 25.6 ± 5.27; G3: 29.95 ± 10.47) show significant (P<0.05) increasing compare with healthy groups (G1: 5.3 ± 2.29; G2: 2.4 ± 0.76; G3: 3.1 ± 0.62) as shown in Table 2.

Inhibin B, LH and FSH

Inhibin B levels show significant (P<0.05) increase in patients groups (G1: 137.9 ± 20.4; G2: 109 ± 27.8; G3: 99.6 ± 8.5) compare with healthy groups (G1: 82.3 ± 4; G2: 77.7 ± 7.1; G3: 74.8 ± 17.2). LH levels show significant (P<0.05) increase in patients groups (G1: 10.6 ± 1.57; G2: 8.7 ± 1.14; G3: 8.54 ± 1.02) compare with healthy groups (G1: 3.8 ± 0.66; G2: 3.6 ± 0.81; G3: 3.3 ± 0.44). About FSH levels, the results show no significant changes between patients (G1: 5.97 ± 0.86; G2: 5.5 ± 0.62; G3: 5.33 ± 0.55) and healthy women (G1: 5.73 ± 0.55; G2: 5.57 ± 0.47; G3: 5.47 ± 0.38) in all groups of experiments as show in Table 2.

Table (2): valves different types of hormones and its correlate with age groups of women with PCOS and control

Groups / Hormones		First group: 12-21 year	Second group: 12-21 year	Third group: 12-21 year
Leptin (ng/ml)	Patient	18.52 ± 4.78 a	18.76 ± 5.11 a	21.28 ± 8.5 a
	Healthy	4.38 ± 2.01 b	2.15 ± 1.84 b	5.39 ± 4.24 b
Insulin resistance (mIU/ml)	Patient	19.53 ± 12.45 a	25.6 ± 5.27 a	29.95 ± 10.47 a
	Healthy	5.3 ± 2.29 b	2.4 ± 0.76 b	3.1 ± 0.62 b
Inhibin B (pg/ml)	Patient	137.9 ± 20.4 a	109 ± 27.8 a	99.6 ± 8.5 a
	Healthy	82.3 ± 4 b	77.7 ± 7.1 b	74.8 ± 17.2 b
LH (mIU/mL)	Patient	10.6 ± 1.57 a	8.7 ± 1.14 a	8.54 ± 1.02 a
	Healthy	3.8 ± 0.66 b	3.6 ± 0.81 b	3.3 ± 0.44 b
FSH (mIU/mL)	Patient	5.97 ± 0.86 a	5.5 ± 0.62 a	5.33 ± 0.55 a
	Healthy	5.73 ± 0.55 a	5.57 ± 0.47 a	5.47 ± 0.38 a

Note: same letters mean non-significant changes and different letters mean significant changes.

Discussion

Polycystic ovarian syndrome (PCOS) is one of the most endocrine disorders, affecting 5−10% of women (6). In these patients, an increase in insulin resistance and differents sexual hormones and in central body fat accumulation has been observed independent of obesity (18). In study carried by Upadhyaya *et al.* (2011) to show the effect of polycystic ovarian syndrome on leptin and insulin resistance. They discovered that the leptin an insulin resistance levels increased in patients with PCOS (19). Patients of this study suffering obesity compare with apparently healthy,

according to Angioni *et al.* (2008), approximately 40 to 50% of women affected by PCOs are overweight or obese, frequently presenting high insulin levels and reduced glucose-induced insulin metabolism (20).

Ardekani *et al.* (2009) reffered that the Leptin level is increase in obesity and play important role in the development of insulin resistance in patients. So, in their study they found relationship between total leptin levels with BMI, insulin resistance levels in overweight PCOS patients (21), because leptin is predominantly synthesized by adipocytes, and higher BMI results in higher fatty tissue and increase synthesize of leptin (22).

Awadalla *et al.* (2014) studying the relation between the inhibin b and PCOS. They found inhibin b levels increased in overweight PCOS compare with control group. They suggest that PCOS patients might over secrete inhibin B due to increased numbers of small antral follicles, this effect is counteracted by the increased body mass index which occurs in a large number of PCOS patients (23). In study designed by Hassan *et al.* (2012) to show The effect of inhibin B on ovarian response in patients with polycystic ovary. They measuring inhibin B concentration in patients and healthy women demonstrated that inhibin level in PCOS patients was significantly higher than that in control group (24). Kanwar *et al.* (2015) referred that the PCOS lead to hormonal disorders in patients. They studying are different hormones (LH, FSH, Prolactin and TSH) in women with PCOS. They found LH and FSH levels increased in overweight PCOS compare with control group (1). Other studies showed that these hormones were related to other parameters such BMI (25). Alao, Cakir *et al.* (2012) referred that the women with PCOS had higher LH levels in comparison to controls (26), that is in agreement with the present study.

Conclusion

Leptin, Inhibin B insulin resistance and LH levels are significantly higher in polycystic ovary syndrome (PCOS) patients than healthy women group during early follicular phase of menstrual cycle.

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