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Study of Some Hematological and Hormonal Changes in Patients with (PCOS)

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ABSTRACT

Poly cystic ovary synrdome (PCOS) is a common endocrinological disorder among women of the reproductive stage. The current study was conducted to evaluate some hormonal and hematological alterations in patients with poly cystic ovarian syndrome(PCOS), BMI or the body mass index was determined for all women, serum hormones (SHBG), Estradiol ,DHEAs , Leptin ,Inhibin-B, were measured, and hematological changes include PAI-1 activity, fibrinogen and t-PA antigen also measured. The results of the present study showed, there were significant increase ($p<0.05$) in BM, DHEAs**,** Leptin , Inhibin-B , PAI-1 ,fibrinogen and t-PA antigen in PCOS women compared with the control group, but asignificant decrease ($p>0.05$) in SHBG and $E_{2.}$

Key Words: PCOS , Leptin , Inhibin-B , SHBG, PAI-1

INTRODUCTION

The poly cystic ovary syndrome(PCOS) is very predominant endocrinological disturbances in women. It is distinguished by excess of androgen, oligo-anovulation leading to menstrual irregularity, disorder in glucose metabolism including insulin resistance, and polycystic ovaries associated with changing in ovarian morphology (1 ; 2). Hyperinsulinemia and insulin resistance may also be factors that affect on levels of leptin as proved in some studies (3). Women with PCOS have high risk of developing diabetes mellitus, obesity, hypertension, depression and anxiety (4). Obesity can inhibit human reproduction by various means such as altered secretion of sex hormone binding globulin (SHBG) , and "gonadotropin-releasing hormone"(GnRH), leading to an alteration of androgen and estrogen delivery to target tissues, resistance of insulin and hyperandrogenism (5). Since the extra androgen is the major feature of PCOSs, it was important to concentrate on it.

The ovary produces up to 60% of androgen in PCOS, whereas adrenal gland supplies the remaining 40% . It is well-known that androgens from both the ovary and the adrenal are the principal sources of hyperandrogenism in women with PCOS (6). Hyperandrogenemia is strongly related with hyperinsulinemia, but the mechanism is indistinct (7). The inhibins are peptides created in the ovary that can adjust secretion of pituitary follicle stimulating hormone(FSH) by an endocrine mechanism (8). It manufactured by the granulosa cells of normal and PCOS follicles, and possibly by the theca in PCOS follicles (9). Abnormalities of inhibin secretion have long been assumed in the pathogenesis of PCOS (10). Concerning PAI-1 , it is a glycoprotein single-chain, consisting of 379 or 381 amino acids (11). It manufactured in endothelial cells, adipocytes, and hepatocytes in response to hormonal or metabolic stimuli, and inflammatory condition. Disturbances in PCOS may also be supported by other findings, "such as increased the level of PAI-1" (7). The initial studies showed a coincidence between disease and elevations in plasma PAI-1. The probability of a causal link between high levels of PAI-1 and pathological conditions was observed in several

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studies, measuring either PAI-1 activity or antigen (12). The present study aims to evaluate the hormonal and hematological changes in Iraqi women with PCOS (Poly cystic ovary syndrome).

Material and methods

The blood samples of PCOS patients and non-patients were collected on the second and third day of the menstrual cycle, from "Children's & Women's Hospital " in AL-Ramadi city. The samples were (80) which include (60) of women with PCOS and 20 healthy women were selected as control group, their age range was 19-35 year. Serum levels of (SHBG), Estradiol ,DHEAs , Leptin ,Inhibin-B, and PAI-1 ,fibrinogen and t-PA antigen were measured using ready for use ELISA kits were applied by DRG company .

Body mass index (BMI) ,was calculated for all women from the following formula: BMI=Weight(Kg)/Height(m^2).The results were statistically analyzed using SPSS, for comparison between the patients and control group t-test has been used. All results have expressed as the mean values ± standard deviation (SD). The significance level has at $p<0.05$.

Results and Discussion::

Table (1): The parameters in PCOS patients and healthy group expressed as mean standard deviation (SD):

Parameter	**Control n=20**	**PCOS n=60**	**Significance p>0.05)**
Age(year)	28.8 ± 3.8	30.1 ±4.2	0.030
BMI(kg/m^2)	27.6 ±3.5	31.1 ±7.5	0.0001

The results showed that BMI in this study was significantly increased in PCOS when compared with control group. This agreement with (13), who found when compared values with healthy women, BMI was significantly increased in PCOS. The production of adipokine by subcutaneous and visceral fat seems to play a part in function of metabolic prosses which, in turn, causes insulin resistance and hyperinsulinemia that leads to ovarian androgen production and thus causes PCOS (14).

Table (2): Serum hormones in PCOS and healthy group expressed as mean standard deviation (SD):

Serum Hormones	**Control n=20**	**PCOS n=60**	**Significance** p>0.05)
Estradiol nmol /l	0.22 ± 0.17	0.14 ±0.07	0.001
SHBG nmol/l	63.35 ±6.65	40.1 ±4.1	0.020
DHEAs mg/dl	186.5 ±21.4	279.3 ±18.7	0.030
Leptin ng/ml	15.7 ±8.2	29.5 ±13.1	0.001
Inhibin-B pg/ml	60.46 ±3.10	65.35 ±3.92	0.000

In this study , the findings showed that there is a significant decrease $p>0.05$ in estradiol hormone in PCOS patients compared with the control group, this results agreed with (15), many

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researches, which demonstrated the inability of the ovary to form ovarian hormones (estradiol and progesterone) by granulosa cells and this would lead to a reduction in levels of these hormones against an increase in the levels of androgenic hormones (16). As for the (SHBG) levels in this study, it revealed a significant decrease $p>0.05$ in PCOS women compared with control group. Krishnan and Muthusami (6) stated that the levels of sex hormone binding globulin (SHBG) are negatively related with the circulating insulin levels, or with "degree of insulin resistance" in women with PCOS or without, proposing the oppressive influence of insulin on SHBG. This is in agreement with what was indicated by Mannerås-Holm *et al*, (7) who found insulin also inhibits production of SHBG.

Our results also showed the levels of the DHEAS were a significant increase ($p>0.05$) in PCOS women. Elevated levels of circulating DHEAS are sufficient to suggest the presence of hyperandrogenism. Although "PCOS" is considered a syndrome with increase androgen secretion from the ovarian. DHEAS is also raise in many patients. In other studies increased levels of serum DHEAS were obtained in about 50% of affected women with "PCOS" (1)

Oh *et al*.,(17) revealed that the obesity can also lead to ovarian hyperandrogenis m due to low chronic inflammation by secretion of adipokines such as "leptin" that directly effects on the ovary. The results showed that serum leptin levels were a significant increase ($p>0.05$) in PCOS women, when compared with the control. Some studies reported increased leptin leveles in patient with pcos and suggested that leptin acts a strong role in the syndrome pathogenesis (18), contrary to what was indicated by Telli *et al* .,(19) who reported that serum leptin levels were not higher in women with PCOS compared with the control group . A previous studies found that a positive correlation between serum leptin and "BMI" in patients with PCOS (3). The results also showed the levels of the inhibin B were higher in PCOS women, these results are similar with (20 ; 21). Un like with other study inhibin B levels were similar to those of normal controls (22). Magoffin and Jakimiuk (8) discovered that the predominant type of inhibin in polycystic ovaries is inhibin B. The higher concentration of "inhibin B" in women with PCOS maybe indicates the increased number of small antral follicles present in this condition (23).

Table (3): Hemostatic variables in PCOS and healthy group expressed as mean standard deviation (SD):

Hemostatic Variables	**Control n=20**	**PCOS n=60**	**Significance p>0.05)**
PAI-1 activity Iu/ml	10.1 ± 11.2	22.7 ±23.6	0.003
Fibrinogen g/l	2.74 ±0.51	3.3 ±0.8	0.002
t-PA antigen ng/ml	7.76 ±0.78	9.82 ±0.62	0.030

The table above showed that the PAI-1 activity in this study was elevated in women with PCOS than control. Higher (PAI-1) level is an essential feature of insulin resistance (24). Mannerås-Holm *et al* (7) reported that resistance of insulin impairs fibrinolysis through enhancing PAI-1 secretion. Increasing the concentration of PAI-1 in the circulation hinders fibrinolysis by impairing the action of t-PA (25). Insoluble fibrin during fibrinolysis is digested by the plasmin, which is transformed from its inactive precursor plasminogen by the action of " urokinase-plasminogen activator (u-PA) or tissue-PA (t-PA) on the surface of the fibrin clot. Therefore, plasmin, the enzyme responsible for

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fibrin degradation (26). On the other hand**,** t-PA antigen showed significant increases in women with PCOS than control**,** this result agreement with Kelly *et al* (27), who noted that t-PA concentrations in PCOS correlated directly with the degree of obesity

Conclusions:

Poly cystic ovary synrdome can be considered as a complex disorder among women. The patients revealed there were significant increase ($p<0.05$) in BMI, DHEAs**,** Leptin , Inhibin-B , PAI-1 ,fibrinogen and t-PA antigen in PCOS women compared with the control group, but there were asignificant decrease ($p>0.05$) in SHBG and E_2 .

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