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Effect of Polycystic Ovarian Syndrome on the Lipid Profile and sexual Hormones

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Abstract

This study was conducted to determine the effect of polycystic ovary syndrome (PCOS) on central obesity, body mass index (BMI), level of lipid profile (cholesterol, triglyceride, low density Lipoproteins (LDL), high density lipoproteins (HDL), and sex hormones (luteinizing hormone (LH), follicular stimulating hormone (FSH), testosterone, and progesterone) in women with PCOS. BMI, central obesity, lipid profile, and sex hormones level were measured in 20 healthy women (control group) and from 50 blood samples from PCOS patients aged 18-24 years. The results showed a non-significant increase in the central obesity and BMI in PCOS patient than of the control group, while the study showed a significant increase in the level of lipid profile in PCOS patients group than of control group (0.01). Also, the sex hormones were significantly increased in PCOS patients group than in the control group (0.05), except for the progesterone level, which was lower in PCOS patients group than in the control group (0.05).

Key word: PCOS, Lipid panel, Sex hormones, Hyperandrogenism.

INTRODUCTION:

Polycystic ovarian syndrome (PCOS) is one of the most common hormonal disorders affecting approximately 10-5% of women that in reproductive age and is considered the main reason of infertility [1],[2]. Several factors that are responsible for the development of (PCOS) include that the disease is hereditary but its symptoms evolved through lifestyle and environmental factors [3]. The main symptoms of PCOS including menstrual irregularity (amenorrhea), appearance of acne and Hirsutism [4-6], PCOS is associated with the androgenous obesity type [7-8] and the central obesity [9], PCOS causes an increase of level of androgen hormones such as increasing of level of testosterone hormone higher than normal range, this lead to increase of length of menstrual period reach 35 days [10]. PCOS is considered risk factor of insulin resistance, diabetes mellitus 2, hypertension [11-12], abnormal level of lipids [13], and cardiovascular disorders [14]. This study conducted in order to investigated the effect of PCOS on level of lipid profile and sex hormones.

MATERIAL AND METHODS:

Subjects of study:

The present study was conducted in the center of the Family Organization in the feminine and children hospital in Al- Muthanna Governorate, the study included 50 women with PCOS aged from (18-24) year, as well as (20) women without PCOS (control). PCOS diagnosed according the criteria of Rotterdam which depended on two of the following criteria:

- Oligo- or anovulation.
- Biochemical and clinical evidences for hyperandrogenism.
- polycystic ovarian based of ultrasonography) [15].

The safety of patients from disease may be affected on study's parameters such as diabetes mellitus, cardiovascular disorders, renal diseases, dyslipidemia, and thyroid disturbance. The questionnaire was filled for each women include: name, age, married state, presence of abortion states, menstrual states, disease symptoms, length of disease period, waist circumfuses, hip, weight and height.

Anthropometric measurement:

Body mass index (BMI) was calculated according following formula as:

BMI = Body weight (kg) / (High (m))^2 [16].

Central obesity was calculated by dividing by waist circumference (cm) by height [17].

Lipid profile assay:

The lipid profile (total cholesterol, triglyceride, high density lipoprotein (HDL) were analyzed by spectrophotometry according the method of enzymatic colorimetric by using kit from Biolab/France, while low density lipoprotein cholesterol (LDL) was calculated by Friedewalds' formula:

LDL-c= TC – (HDL-c – triglycerides/5) [18].

Hormonal assay:

Luteinizing hormone (LH), follicular stimulating hormone (FSH), testosterone, and progesterone were analyzed by ELIZA by used Biocheck, Inc kit [19].

The statistical analysis:

Software SPSS/version 20 used in statistical analysis. Destructive (mean and standard deviation), the analysis of variance (ANOVA) and F test were calculated for all parameters in order to comparison between PCOS group and control (without PCOS) group.

RESULTS AND DISCUSSION:

The results included fifty women with polycystic ovarian syndrome (PCOS), mean aged (26.04± 5.28), and twenty women without PCOS, mean aged (23.60±4.64). the results showed there was non-significant increase of body mass index (BMI) (25.06 ± 4.302 (kgm/m²)) and central obesity (0.93980 ± 0.015451) of PCOS women than in control women (23.21 ± 2.11 (kgm/m²)) and (0.93800 ± 0.010823) for BMI and central obesity respectively.

The level of the lipid profile (total cholesterol, triglyceride, high density lipoprotein (HDL) and low density lipoprotein cholesterol (LDL) were presented in table (1), where in this study the lipid profile level showed significant increase in PCOS women group at (0.01) than of control (without PCOS) women group.

Table 1: Lipid profile level in PCOS women and control groups.

Lipid profile	PCOS women mean ± SD	without PCOS women mean ± SD
Cholesterol	247.8** ± 15.0	219.7 ± 33.7
Triglyceride	175.7** ± 22.0	150.06 ± 23.1
High-density lipoproteins (HDL)	44.5** ± 7.9	28.8 ± 7.1
Low-density lipoprotein (LDL)	171.02** ± 20.4	134.5 ± 25.5

** *significant at level (P<0.01), (SD) standard deviation*

The statistical analysis of **PCOS** women showed significant increase of level of luteinizing hormone (LH), follicular stimulating hormone (FSH), and testosterone (0.05) than control group except the progesterone level was significant decrease in **PCOS** women than of control group at 0.05 , (table 2).

Table 2: Sex hormones level in PCOS women and control groups.

lipid profile	PCOS women mean ± SD	without PCOS women mean ± SD
Luteinizing hormone (LH)	15.4036* ±14.51421	4.8193 ± 2.92597
Follicular stimulating hormone (FSH)	16.2896* ±12.79869	5.7993 ± 2.91647
Testosterone	0.7062* ± 0.19576	0.5520 ± 0.13007
Progesterone	0. 3520 ± 0.17766	0.8240* ±1.04977

** *Significant at level (P<0.01), (SD) standard deviation.*

The results of other studies [20-24] were consistent with the results of the current study, which showed that women with **PCOS** had a significant increase in lipid concentration (total cholesterol, triglyceride, high density lipoprotein (HDL) and low density lipoprotein cholesterol (LDL).

On the other hand the results of the current study were inconsistent with the results of [25] which showed no significant difference in lipid concentration (total cholesterol, triglyceride, high density lipoprotein (HDL) and low density lipoprotein cholesterol (LDL) between women with **PCOS** and control group.

Lipid abnormalities were closely associated with insulin resistance [26]. The increase in triglyceride (TGs) may be due to its accumulation, which may occur due to build-up of body fat increased, fat elimination rate decreased or fatty acids oxidation decreased. Increasing of very-low-density lipoprotein (VLDL) secretion by the liver resulted in high concentration of plasma TGs. This may occur due to insulin resistance, which appears in PCOS patients. Insulin resistance also increases the metabolism of HDL-C molecules and the formation of LDL-C [27].

Hyperandrogenism contributes to change of lipid form, hyperandrogenism was associated with increased of hepatic lipase activity, which plays a role in the metabolism of HLD-C molecules. Increasing of serum triglyceride TGs concentration considered a risk factor of cardiovascular disease [28].

As to the level of sex hormones of present study, the results of the previous studies of [29] showed that a significant increase in the level of the LH and FSH, also the results of [30] showed significant increase in the level of the LH and FSH, and testosterone of PCOS than of control group, this corresponds to the results of our current study.

While the results of a study conducted by [31] showed increase level of LH, testosterone and androstenedione (a progesterone derivative) and decreasing of FSH level of **PCOS** group .

Hyperandrogenism is one of the main signs of polycystic ovarian syndrome and may be attributed to increased level of insulin hormone and its effect on theca cells of the ovary [32].

CONCLUSION:

We conclude from the current study that polycystic ovarian syndrome (**PCOS**) lead to increase of lipid profile (total cholesterol, triglyceride, high density lipoprotein (HDL), and low density lipoprotein cholesterol (LDL)) and level of sex hormones (luteinizing hormone (LH), follicular stimulating hormone (FSH), testosterone, and progesterone), this affects the health of women, so it is necessary to perform an early and periodic examination of the lipid profile and sex hormones in women with PCOS in order to reduce complications.

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