Estimation of Serum AdiponectinIrisin and Apelin in Iraqi Obese Women Patients with Polycystic Ovary Syndrome

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Abstract

Polycystic ovary syndrome (PCOS) is a status that impact a woman's hormone levels.A total of (128) samples was divided into four groups (Obese with PCOS, low weight with PCOS ,Obese without PCOS ,and Healthy control) collected from Kamal Al-Samarraiehospital, Ministry-of Health in Baghdad-Iraq during the period of April 2017- August 2017. The aim of the study toevaluation from Serum AdiponectinIrisin and Apelin in Iraqi obese women patients with PCOS. The result shows The BMI of obese with PCOS patients and obese without PCOS was significantly higher ($P<0.05$) when compared to the values of the control group. No significant with other groups ,also Significant increase of Prolactin ($p<0.05$) in Obese with PCOS and low weight with PCOS groups in relation to Obese without PCOS and control groups. A non- significant elevation ($p>0.05$)when comparing between Obese without PCOS, and control groups. The levels of FSH , LH and Testosterone showed significantly change($p<0.05$) in Obese with PCOS and low weight with PCOS groups when comparing with Obese without PCOS and control group. followed by no-significant with other groups ,also shows significant change($p<0.05$)when comparing between Obese without PCOS and control group ,showed that adiponectin level showed a significant higher level in the control group ,Obese without PCOS group ,low weight with PCOS patients ,and Obese with PCOS patients . Oppositely, the results of the Irisin showed a significant higher level in the Obese with PCOS patients then the low weight with PCOS group followed by the Obese without PCOS and control group. While Apelin level recorded the highest level Obese with PCOS group.

Key Words: *Polycystic ovary syndrome,Prolactin,FSH,LH , Testosterone, Body mass index,Adiponectin,Irisin, Apelin.*

Introduction

Polycystic ovary syndrome is a popular endocrine condition related With hyperandrogenism, infertility and metabolic dysfunction. The syndrome was officially recognized in the 1930's by Stein and Leventhal, who associated polycystic ovaries (PCO) to the clinical features of menstrual dysfunction, infertility, hirsutism and obesity [(1).] Androgen overabundance and insulin impedance, the two of which have powerful genetic components, underlie a great part of the clinical display . Specifically, a few studies have demonstrated that the raise androgen levels may influence adipokine produce and, increment pervasiveness and cardiovascular impacts from metabolic syndrome [(2).]A major proportion from women with PCOS have boosted levels of LH and natural/diminished levels from FSH [(3).] The excess in LH is explained by an increment of the hypothalamic gonadotropin-releasing hormone(GnRH) [(4).]In the Granulosa cells(GC_s), FSH invigorates the expression from enzymes that metabolize androstenedione to estradiol . Studies from follicular liquids and in vitro investigations of (GC_s) from anovulatory PCOS ladies show that GCs, generally, remain steroidogenically dynamic with expanded aromatase movement, comparably from non-PCOS ladies. So, expanded estradiol production in PCOS is subordinate on the ovulatory condition of the patient, yet in addition on body weight [(5 , 6).]Adiponectin is a 244-amino-acid-long polypeptide. There are four distinct areas in adiponectin with molecular weight of 30 Kilo Dalton (30KD) [(7)]In Female: Adiponectin, AMPK and PPARc work in show to organize ability homeostasis in the ovary and guarantee appropriate development of ovarian follicles and oocyte.

Adiponectin is involved in endometrial changes in anticipation of embryo implantation and assume a potential role in fetal upgrowth and improvement [8].

Materials and Method

Samples collection

The current study carried out at the Kamal Al-Samarraiehospital, Ministry-of Health in Baghdad-Iraq during the period from April 2017- August 2017.The study was conducted on normal Weight (50) and obese (78) with polycystic ovarian syndrome,as following groups:

Group (1): Includes 50 patients. The patients were obese with polycystic ovarian syndrome.

Group (2): Includes 27 patients were normal weight with polycystic ovarian syndrome.

Normal, healthy individuals: For the purpose of rapprochement, 50 healthy individuals (Control) were enrolled in this study. The individuals were recruited into the following groups:

Group (3): Includes 25individuals. The individuals were obese

Group (2): Includes 25 individuals were normal weight.

All patients must be fastened overnight [10-12 hours] when they attended at the morning of 2nd-3rd day of their menstrual cycle.Five milliliters of blood was collected from each patient and control into gel tube to obtained of serum centrifuged the tube at 3000 rpm for 5 min.

Measurements

Enzyme-linked immunosorbent assay (ELISA) were used to estimate the serum level of Adiponectin according to the manufacturer's instructions (bioaimscientific) and Hormonal analysis for LH, FSH, Teststrone,and prolactin was performed by using the Automated Immune Assay (AIA) by the VIDAS auto analyzer, (BioMérieux Company, France).

Results

The results illustrated in table (1) showed BMI within first group was 32.2Kg\m^2, while the second group recorded 21.09Kg\m^2,and third group were 32.8Kg\m^2 compared to control group 21.12Kg\m^2. The obese subjects who suffered from PCOS and obese that not suffered from PCOS recorded BMI values significantly higher (P<0.05) in comparison to control group. In addition the comparison between the BMI of low weight subjects with PCOS with control group were insignificant (P>0.05), and a non- significant differences in obese with PCOS patients as compared to obese without PCOS.

Table (1) Comparison Body mass index between controls and PCOS patients.

Groups	No. Subjects	Body mass index (kg/m2)
Group 1 (Obese with PCOS)	50	32.2*a
Group 2 (low weight with PCOS)	27	21.09*b
Group 3 (Obese without PCOS)	25	32.8*a
Group 4 Healthy control	25	21.1

♦Results are expressed as mean± SE. ♦[a]ANOVA: Obese with PCOS and Obese without PCOS vs. Control: * p< 0.05, ♦[b] ANOVA: low weight with PCOS vs. Healthy control: * p< 0.05.

The results in table (2)can be summarized as follow. The prolactin level showed a significant increase (p<0.05) in Obese with PCOS and low weight with PCOS groups in contrast to Obese without PCOS and control groups.While a non-significant increment (p>0.05) appeared when comparing Obese without PCOS and control groups.The hormones FSH, LH and Testosterone levels were changed significantly (p<0.05) in both group of PCOS (Obese and low weight) when comparing with Obese without PCOS and control group, while comparing between those groups of the PCOS obese and low weight showed non-significant change (p>0.05) while significant change (p<0.05) shown when comparing between Obese without PCOS and control group.

Table (2): Comparison of endocrine parameters between control and PCOS patients groups.

Parameters Groups	**Prolactin ng/ml (mean+SD)**	**FSH mIU/ml (mean+SD)**	**Testosterone ng/ml (mean+SD)**	**LH mIU/ml (mean+SD)**
Group 1 (Obese with PCOS)	A 15.066+1.945	A 7.617+1.095	A 0.638+0.072	A 8.274+2.165
Group 2 (low weight with PCOS)	A 14.264+1.839	A 7.019+1.554	A 0.694+0.067	A 8.261+2.096
Group 3 (Obese without PCOS)	B 9.628+2.074	B 5.496+0.957	B 0.955+0.064	B 6.253+1.255
Group 4 Healthy control	B 8.855+1.417	C 3.895+0.672	C 1.251+0.263	C 4.238+1.195
LSD	2.517	1.061	0.097	0.896
P-value	0.0115	0.0053	0.00728	0.0029
Significant	Significant	Significant	Significant	Significant

*different letters mean significant difference

The result in the table (3) showed that a significantly higher level of adiponectin in control subjects (22.461+2.350) followed by the Obese without PCOS group (19.767+2.244) then the low weight with PCOS patients (13.252+1.154) and Obese with PCOS patients (10.236+1.288). while in contrast to adiponectin, the results of the Irisin showed a significant higher level (p= 0.009) in the Obese with PCOS patients (1445.8+289.0) then the low weight with PCOS group (999.2+85.5) followed by the Obese without PCOS and control group (782.1+46.4 and 776.6+94.7, sequentially). While apillin level recorded the highest level Obese with PCOS group (11.431+0.984, p= 0.0102).

Table (3): Levels ofAdiponectin,Irisin ,and Apelinin PCOS women and healthy controls.

Parameters Groups	**Adiponectin (ng/ml) (mean+SD)**	**Irisin (pg/ml (mean+SD)**	**Apelin (ng/ml) (mean+SD)**
Group 1 (Obese with PCOS)	C 10.236+1.288	A 1445.8+289.0	A 11.431+0.984
Group 2 (low weight with PCOS)	B 13.252+1.154	B 999.2+85.5	B 5.120+0.301
Group 3 (Obese without PCOS)	A 19.767+2.244	C 782.1+46.4	B 5.119+0.241
Group 4 Healthy control	D 22.461+2.350	C 776.6+94.7	B 3.826+0.301
LSD	2.06	104.27	2.11
P-value	0.016	0.0094	0.0102
Significant	Significant	Significant	Significant

*different letters mean significant difference

Discussion

Numerous studies a proved that polycystic ovary syndrome (PCOS) have involved in obesity, as the insulin resistance increase the body mass and dyslipidemia which in turn lead to an increased chance for cardiovascular disease and diabetes [9]. Numerous studies proved that thatabdominal obesity increased in PCOS women of fertile age compared with healthy subjects (9,10).Obesity the last decades are considered as major chronic diseases all around the world. As previously mentioned PCOS is associated with excess weight . So for that reasons the obesity treatment should be based editing the lifestyle by diet, exercise and behavior modification. It has been reported that, that ovulation increased after losing as minimum 5 % of the initial body weight in obese women [11].

In usual, women with PCOS are usually described by increased circulating LH levels in addition decreased FSH levels [12].While some other PCOS patients with hyper-androgenism and especially to those have obesity, shown non-elevated basal or stimulated LH levels and those may lead to heterogeneity of presentations of the syndrome. The using of LH level as biomarker of GnRH so negative correlation between the levels of GnRH and LH has also been shown in studies [13,14] proved that gonadotropin releasing may increase by hypothalamus which may lead to increased release of follicle stimulating hormone (FSH) from the pituitary gland in PCOS.In addition Shibli-Rahhal and Schlechtesuggested that prolactin modulate the body weight as there is an association between prolactin level and weight gain, but still uncertain the mechanism whether obesity associated with hyper-prolactin due to stimulation of lipogenesis or due to disruption of central nervous system (CNS) [15]. While, Hernandz [16].added that a decreased level of dopamine (DA) could cause the raise in prolactin level which usually present in women with PCOS. In our study, patients with PCOS had significantly higher ($P<0.05$) levels of testosterone compared to controls. And those results agreed with previous studies the average level of testosterone increased in the most of PCOS patients. In addition androgen action declining with aging. but also in controls, androgen levels gradually decrease through time, as has been shown in several studies [17,18]. Numerous research have examined adiponectin levels in women with PCOS, and our present results agreed with who proved the lower adiponectin levels in the obese PCOS group than in the non-obese control group. The other parameter Irisin, was discovered for factors secreted by muscle in response to exercise in 2012 [19]. And because of its activity in reducing body weight so still hypothesized that circulating irisin is increased in a compensatory manner to overcome or counteract the increasingly aggravated IR, and such condition can be found in metabolic disorders disease such as PCOS [20]. Our results agreement with [21] who reported irisin level higher in patients with PCOS than that in the healthy controls. That could be similar to apelin level which also showed increased levels in patients and its related with the occurrence of obesity. Those results disagreed with [22] who reported lower apelin level in normal-weight PCOS women than in control subjects. In contrast, our results were in agreement with[23,24,25] who reported that the average level of apelin is higher in PCOS.

Conflict of Interest: There is no conflict of interest among the authors.

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Ethical Clearance: This study is ethically approved by the Institutional ethical Committee.

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