

DOI: <http://doi.org/10.32792/utq.jceps.09.02.03>

Study of Some Hormonal Disorders Associated With Polycystic Ovarian Syndrome in Women in Thi Qar Governorate

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Received 30/09/2018,

Accepted 20/12/2018,

Published 02/06/2019



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Abstract:

This study was conducted in infertility units at Al Hussein Educational Hospital for the period from 1-9 - 2017 to 1-3-2018, Fifty satisfactory cases of women with PCOS were monitored and compared to a group Control, which included 40 healthy women. The study examined the changes in some biochemical properties and their relationship with the blood components in women with polycystic ovary syndrome (PCOS). They included measuring the concentrations of hormones in the serum of women with the syndrome and comparing them with non-infected women such as LH and follicle stimulating hormone (FSH), As well as to identify the proportion of LH hormone to FSH. The results of the statistical analysis showed a high significant increase in women with the syndrome in concentration of the Luteinize hormone (LH) and LH to FSH ratio, ($p < 0.05$) the arithmetic average of each is (6.49 ± 3.32 , 1.52 ± 0.61 mIU/ml) Respectively, While the average value was in the control group (3.09 ± 0.94 , 0.57 ± 0.189 mIU/ml) Consecutively. While no statistically significant difference was observed for the follicle stimulating hormone (FSH) between the two study groups.

Key words: PCOS, Infertility, Hyperandrogenism, BMI.

1. Introduction:

Polycystic ovary syndrome (PCOS) is the most endocrine disorders commonly affecting 4-12% of women of childbearing age with a wide range of symptoms including: menstrual disturbances and infertility, obesity, and hirsutism, acne, irregular cycles, and endocrine abnormalities (including high LH/FSH ratio, hyperandrogenemia, and excessive insulin blood hyperinsulinemia), and the emergence of multiple ovarian cysts polycystic ovaries when ultrasound imaging. PCOS is one of the most common causes of ovulation infertility (Majumdar and Singh, 2009) ; (Moran and Teede., 2009).

Infertility: Infertility is defined as the inability of the couple is anti-pregnancy to achieve pregnant in one year (Roupa *et al* .,2009); (Turchi.,2015). Infertility is still a widespread global condition. And affects between 8 and 12% of couples of childbearing ages worldwide (Inhorn and Patrizio2015).

Primary infertility is diagnosed in couples who have no children, while secondary infertility is diagnosed when the female is pregnant at least once, but is unable to tolerate subsequent pregnancies (Whitehouse and Hollos, 2014) . Female infertility can be due to different conditions such as ovulation disorders, uterine

or cervical abnormalities, Fallopian tube damage or blockage, endometriosis, primary ovarian insufficiency, pelvic adhesions, and the use of cytotoxic chemotherapy to treat cancer (Abrao *et al.*, 2013). Moreover, it can be disturbances in hormones that play a crucial role in the development of infertility cases. These hormonal disorders may include one or more sex-related hormones, including prolactin (PRL), thyroid stimulating hormone (TSH), follicle-stimulating hormone (FSH) Luteinizing hormone (LH) (Veeresh *et al.*, 2015).

The main causes of infertility in females are tubal and peritoneal factors (25-35%) factors, ovulatory factors (30-40%), endometritis (1-10%) (Dutta and Chakravarty, 2003) Among the factors of ovulation is polycystic ovarian syndrome is one of the most important causes of infertility. PCOS affects 4% to 12% of women in childbearing age (Knochenhauer *et al.*, 1998).

This syndrome can result from an abnormal function of the hypothalamus-pituitary-ovarian (HPO) axis. This is associated with important reproductive diseases, including infertility, secondary amenorrhea and increased pregnancy loss.

The aim of the current study was to determine the concentration of hormones in the serum of infected women and compare them with non-infected women ,LH , FSH and the ratio of LH to FSH to try to find any significant difference in the concentration of these hormones between the two groups and to know the effect of BMI on women with PCOS.

2- Materials and Methods:

The study sample :

In this study, the sample consisted of 90 women of childbearing age ranging from (18 – 40) years, divided into two groups. The first group consisted of 50 patients with PCOS who were selected from the infertility unit- Al Hussein Educational Hospital, for the period (1/9/2017) to (1/3/2018) were diagnosed by doctors, Their main complaints were infertility and/or menstrual disorders and / or clinical signs of hyperandrogenism (hirsutism, acne), and ultrasound evidence of polycystic ovaries (Rotterdam .,2004), The second group consists of 40 healthy women without any of the above symptoms considered as a control group. All women in both groups were subjected to measure of weight, height and body mass index (BMI).

Blood sample collection: -

The venous blood was withdrawn by 2-5 ml from women with PCOS and healthy women on days 2 and 3 of their monthly cycle and placed in a vacuum of air containing gel, and then left for an hour at room temperature until clotted then separated serum quickly by centrifugation for 3 minutes at (3500 rpm) then its transferred to a plastic tube and stored at -20 °C until analysis.

Hormonal assay:

LH and follicle stimulating hormone (FSH) concentrations were measured for control group healthy and patients group. by using the Enzyme-linked Immunosorbent Assay (ELISA) method and using the ELISA device and a measurement kit designed for this device for each of the hormones and according to the action steps described by each (Tietz.,1995) .

3- Statistical analysis:

The mean and standard deviation was obtained by entering the results data in the Statistical Package of Social Science (SPSS) version 17, the independent t test was used to estimate the differences between the groups, and the differences were statistically significant when $P < 0.05$ (Daniel, 1999).

4- Results and Discussion:

The results of this study showed that about 72% of women with PCOS possess ovaries pocketed, and 68% of them suffer from hirsutism, 78% suffer from lack of menstruation, with the presence of two of the

symptoms listed by 52% of them, in addition to 38% Of those women were diagnosed by meeting three of the previously mentioned symptoms, compared to the control group that did not show any of these symptoms, Table1.

Table 1: shows the numbers and percentages of phenotypes for women with PCOS

Symptoms	number	percentage %
Polycystic ovaries (pco)	36	72
Hirsutism	34	68
Shortness or lack of menstruation	39	78
Having 2 of the above symptoms	26	52
Having 3 of the above symptoms	19	38
Alopecia	27	54
Acne	30	60

Appearance of hirsutism in women with PCOS is a clinical evidence of excessive androgens, which is the key to the emergence of hirsutism (Lobo., 1991), which is defined as, the presence of hair in the approved androgen sites, the hair that does not appear naturally in women (upper lip, chin, chest, upper abdomen, back, etc.), as the sensitivity of the vesicle hair androgen depends on several factors, including the concentration free androgen in the blood serum and the presence of receptors in his hair follicles (Randall *et al.*, 1992). These results are consistent with Stein and Leventhal (1935) who described for the first time correlation of polycystic ovaries, menopause, hirsutism and obesity, for this reason, PCOS known as Stein - Leventhal Syndrome. Acne is one of the clinical features of PCOS caused by an increase in the level of androgen which causes hypercirculation and increased sebum production. AL-Hadidi., (2003) said that increasing the level of androgen in women with PCOS stimulates the division of adipose gland cells and the synthesis of intracellular fat.

Increased levels of androgen also lead to poor ovulation (anovulation / Oligo menorrhoea) by preventing maturation of ovarian follicles and thereby preventing ovulation, which is associated with infertility (Wang and Chard., 1999).

Obesity and metabolic disorders associated with PCOS

It is accepted that obesity increases the symptoms of PCOS, but there is controversy about whether obesity caused the syndrome. Obesity is steadily increasing in the developed world. In fact, the prevalence of obesity has increased all over the world more than doubled between 1980 and 2014. In 2014, 40% of women aged 18 and above were overweight, (WHO., 2016).

Table (2) shows the differences between the patients and control group in relation to the body mass index (BMI) Where the patients had an average body mass index (28.492 ± 5.823 Kg / m²), While BMI in the control group was (24.190 ± 4.282) Kg / m², there was a high significant difference ($p < 0.001$) between the study groups.

Table 2: shows the arithmetic mean of the coefficient of BMI in diseased and control group

group	Mean ± SD	% Less than normal < 18.5 kg/m ²	% Normal weight (18.5-24.9) kg/m ²	% Over-weight (24.9-29.9) kg/m ²	% obese >29.9 kg/m ²
patients	28.492 ± 5.823	0%	28%	36%	36%
control	24.190 ± 4.282	2.5%	60%	30%	7.5%
p- value < 0.001 show significant difference, degree freedom (df) = 88					

BMI can be easily calculated by weight (kg) / height (m²). The effect of obesity on the development of PCOS is associated with insulin resistance and hypertensive hyperinsulinemia, Insulin resistance ranges from 14 to 43% among women with PCOS and is based on the diagnostic criteria used. BMI is also associated with low levels of sex hormones binding globulin (SHBG), and because insulin inhibits SHBG production from the liver (**Pugeat et al., 1996**), However, new insights have suggested that cytokines, and adipokines, more than insulin, can play a role in regulating SHBG.

Obesity may also impair human reproduction. The relationship between obesity and reproductive functions has been known for several years (**Dağ and Dilbaz., 2015**). This is still being explored (**Klenov and Jungheim., 2014**). Several mechanisms share the relationship between fertility and obesity.

Insulin resistance increases and leptin levels are present and hyperandrogen occurs in obese women. Similarly, non-ovulation and changes in levels of adipokine and hypothalamic-pituitary-gonadal axis (HPG axis) and steroidogenesis in obese women affect the reproductive system (**Pugeat et al., 1996**), (**Chen et al., 2013**). Obesity is also linked to abnormal function of the (hypothalamus- pituitary gland -ovaries) through many other mechanisms that contribute to the development of PCOS. These mechanisms influence obesity on the ovaries and on the hypothalamus-pituitary gland (**Richard and Legro., 2012**). The results strongly agree with a number of studies **Pasquali et al., (2006)**; **Balen, (2003)** who reported that overweight (obesity) was common with PCOS and this increases the risk of heart disease and hypertension later of life.

Serological testes:

Polycystic Ovary Syndrome stems from the inability of the ovaries to produce hormones in proper proportions. The pituitary senses that the ovary does not function properly and reacts by releasing abnormal amounts of lutein (LH) and follicle stimulating hormone (FSH). Both hormones are necessary for ovulation, ovarian development and egg release (**Urbanek et al., 2003**). In our study was the arithmetic average of the hormone (LH) is (6.49 ± 3.32 mIU / ml) among women with PCOS, while in the control group was (3.09 ± 0.94 mIU / ml), where the results of the statistical analysis showed a high significant difference (P <0.001) at Morality (0.05) and degree of freedom 88, LH measurement is useful in the diagnosis of ovarian bagging and repeated miscarriage.

Normal level for LH indicates that the ovary is active, but the high excretion refers to ovarian failure or menopause in women. On the other hand, the low level of LH indicates a lack of pituitary gland secretion

in general (Pakarainen *et al.*, 2005) , (Berinder *et al.* , 2007) . This study agreed with Ibrahim *et al.*, (2015) and Dumesic *et al.*, (2007), who concluded that PCOS is a heterogeneous syndrome characterized by excessive lutein secretion, ovarian hyperandrogen, insulin hyperglycemia, and insulin resistance, and this increase in the level of (LH) lead to stimulate theca cells in the ovaries to produce androgens, which in turn inhibits the SHBG, thus increasing the free androgen in the blood that causes hirsutism in women (Kumar *et al.*, 2007) . The increase in LH in the serum of women with PCOS is due to the low level of progesterone and estrogen as the high level of these hormones inhibits the concentration of LH, as the level of these hormones in the serum of women with the syndrome because of the mechanism of negative feedback (Warren and Stiehl 1999); (Christine *et al.*, 2002) .

The concentration of follicle stimulating hormone (FSH) showed no significant difference between women with PCOS and control group ($P > 0.05$). The mean value of women with PCOS and control was (6.22 ± 10.55), (5.62 ± 1.385) mIU / ml, respectively.

In polycystic ovaries, FSH levels may fall below their normal levels or remain constant. The occurrence of the disorder in the LH and FSH hormones is the result of hypothalamus pituitary gland, which causes the difference in the level of these hormones in the affected women (Taylor *et al.*, 1997), found that 20% of women with PCOS did not change with FSH concentration.

In regards to the proportion of FSH / LH was the arithmetic average of the infected women (1.52 ± 0.61 mIU / ml) compared to (0.57 ± 0.189 mIU / ml) in the control group, where the results of statistical analysis showed a very high significant differences between the two groups with respect to these ratios. These results agreed with Banaszewska, *et al.*, (2003) which stated that if you have PCOS , the pituitary gland produces higher levels of LH throughout the month instead of ovulation and ovulation may fail .

Both Yen., (1980) ; Goldzicher., (1981) said that the high proportion of the hormone LH for FSH in the early part of the menstrual cycle is a distinctive feature for PCOS and seems to confirm the rise in LH is a diagnosis of Poly cystic ovary syndrome .

This study also agreed with (Ann, *et al.*, 1997) which reported that 75% of patients who suffer from PCOS disease notes have high LH and 94% rise in the proportion of LH level to the ratio of FSH. table 3

Table3: The arithmetic mean of the concentration of hormones in the control groups and pcos patients.

hormones	groups	number	Mean \pm standard deviation
FSH	control	40	5.62 ± 1.385
	patients	50	6.22 ± 10.55
LH	control	40	3.09 ± 0.94
	patients	50	6.49 ± 3.32
LH/FSH	control	40	$.57 \pm 0.189$
	patients	50	1.52 ± 0.61

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