

Study Relationship between Some Biochemical Parameters in Patients with Polycystic Ovary

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Abstract: The current study included (45) female samples whose ages ranged between (20-40) years. For the period from September to February of the year 2024, the samples were divided into three groups: The group of healthy women: This group included (15) samples of women who did not suffer from polycystic ovary syndrome (PCOS) as a control group, a group of women with the syndrome, and a group Women with endometriosis: This group included (15) women with polycystic ovary syndrome (PCOS) and (15) women with endometriosis. The results of the current study showed that there was a significant change in the level of FSH at the probability level ($P \leq 0.0001$) between the patient groups and the healthy group, as its level increased significantly in women with endometriosis (11.619 ± 0.479) and decreased significantly in women patients with PCOS (7.624 ± 0.293).) compared to its level in the healthy group (9.133 ± 0.247), and it also decreased significantly in women with polycystic ovary syndrome compared to the group with endometriosis.

The statistical results also showed a significant difference in the level of the LH hormone between the groups of patients and the healthy group at the probability level ($P \leq 0.0001$), as it showed a significant decrease in women suffering from Endometriosis (1.109 ± 0.318) compared to the healthy group, while its level increased in women with polycystic ovary syndrome (15.815). PCOS (± 0.289) compared to its level in the group of healthy people (6.925 ± 0.407) and those with endometriosis ($P \leq 0.0001$). Conclusion: Disturbances in the level of sexual and gonadal hormones play a major role in causing the pathological conditions leading to polycystic ovary syndrome and endometriosis.

Introduction

Polycystic ovary syndrome (PCOS) is a common endocrine disorder in women who suffer from it. This disease is characterized by excessive secretion of androgens and gonadotropin. Previous studies have shown that the percentage of women suffering from this disease ranges between 6-20% of women of reproductive age. The main cause of this syndrome is not clear, but there is some evidence that indicates that the disease is genetically related and may occur due to a disorder in the pituitary gland, and it may be due to the ovaries not responding properly to pituitary hormones. There is a theory that indicates that this disease It occurs due to a decrease in dopamine secretion in the upper center of the brain (1).

There are some studies that indicate that an increase in the luteinizing hormone (LH) leads to a decrease in the secretion of estrogen, which causes an irregular response by the cysts in the ovaries. Some studies indicate that this syndrome is related to the presence of a defect in the gene responsible for the work of the hormone insulin, regardless of the diversity of the causes of this disease. This disease must be dealt with. Polycystic ovary syndrome (PCOS) is one of the most important causes of infertility, but this does not mean that the patient cannot become pregnant, as it can be treated through medications specialized in treating this disorder, such as anti-androgen medications, and the patient may resort to cauterization of the ovaries (2).

PCOS is also closely associated with a wide range of metabolic disorders, such as hepatic steatosis, glucose intolerance, hypolipidemia, type 2 diabetes mellitus (T2DM), and hypertension with an increased risk of developing impaired glucose tolerance and an increased risk of developing T2DM. (3).

Follicle Stimulating Hormone (FSH)

It is a glycoprotein consisting of two polypeptide units (alpha and beta) and its molecular weight is about 30 kDa. It is secreted by the cells of the anterior pituitary gland. The alpha unit consists of 92 amino acids, and the beta unit consists of 111 amino acids, but the biological role and immunological properties depend on the beta units. This hormone is measured at a specific time during the woman's menstrual cycle (usually between 2-4 days of menstruation) to be valid for measurement (4).

A high level of FSH indicates a decrease in ovarian reserve, while a decrease in the level of this hormone indicates disorders in the pituitary gland or hypothalamus. The function of this hormone differs between females and males, as this hormone stimulates the growth of immature follicles in the ovaries until the follicles mature. The secretion of this hormone during the menstrual cycle reaches its peak on day 14 of the cycle and begins to decline when ovulation occurs. FSH stimulates certain cells to luteinize the follicle, leading to the production of inhibin. During menopause there is a sharp decrease in inhibin production and a significant increase in serum FSH. The ratio of FSH to LH is a measure to determine the condition of infertile women with polycystic ovary syndrome. This ratio is greater than 2 according to the standard criteria for diagnosing polycystic ovary syndrome. A high ratio causes cessation of the ovulation process and plays a role in stopping the maturation of follicles in polycystic ovary syndrome. Bags(5).

Materials and methods

Equipment and Materials

Table (1) shows the devices and tools used in the study

الجهاز	Origin
Sringes	CHANGHOUH/ China
Centrifuge	G.L.G\ U.S.A
Incubator	FISHER/ U.S.A
refrigerator	ARCELIK/ Turkey
Micro pipet	Slamed/Germany
vortex	Gallenkamp/Germany
C1900i (Minividas)	Mindray/China
test tubes	China

Table 2 shows the Laboratory Kits used in the study

Laboratory Kits	Origin
FSH	Shenzhen Mindray Bio-Medical Electronics/ China
LH	Shenzhen Mindray Bio-Medical Electronics/ China

Study Subjects

The current study included (45) female samples whose ages ranged between (20-40) years. For the period from September to February of the year 2024, the data of each woman was recorded in a questionnaire (Appendix 1) prepared for this purpose, and the samples were divided into three groups:

Group of healthy women: This group included (15) samples of women who did not suffer from polycystic ovary syndrome (PCOS) as a control group, after ensuring that they were safe from

incontinence or menopause and the presence of ovarian cysts through the diagnosis of a specialist doctor and Ultrasound examination and hormone examination.

The group of women with the syndrome and the group of women with endometriosis: This group included (15) women with polycystic ovary syndrome (PCOS) and (15) women with endometriosis after confirmation of the infection and diagnosis by the specialist doctor based on the appearance of two Less symptoms such as (menstrual disorders, biochemical or clinical increase in androgen, presence of a number of cysts on one of the ovaries using ultrasound).

(5) ml of venous blood was drawn from each woman from the group, during days (2-5) of the menstrual cycle and distributed to be placed in test tubes containing a silicone gel tube. Then it was separated by a centrifuge at 3500 revolutions for 15 minutes to obtain The blood serum was then transferred to Eppendorf test tubes. The samples were kept at a temperature of -20 degrees Celsius, and all information was recorded on them until they were used to begin conducting biochemical tests.

LH and FSH hormonal measurements

Luteinizing hormone (LH) and follicle-stimulating hormone (FSH) were measured using the C1900i device and according to the working kit equipped from Shenzhen Mindray Bio-Medical Electronics.

Luteinizing hormone (LH).

Procedure

Luteinizing hormone (LH) was measured by following the steps indicated in the hormone device (C1900i), and it differs from one device to another and according to its manufacturer, as the work was done according to a number of analyzes designated and prepared by the company and according to the steps:

1. Place 25 μ of the sample in the designated place in the device
2. Give a command to the device to calculate LH
3. The results are calculated automatically and appear on the device panel.

Estimating the level of follicle-stimulating hormone (FSH) in blood serum principle

The follicle-stimulating hormone (FSH) was used according to the principle of action of the luteinizing hormone (LH) and by following the steps indicated in the hormone device (C1900i).

Statistical analysis:

The Statistical Analysis System- SAS (2012) program was used to detect the effect of various factors on the study parameters. At least significant difference -LSD and (Analysis of Variation-ANOVA). Chi-square test was used for significant comparison of percentages

Results and discussion

The results of the current study, shown in Table (3), showed that there was a significant change in the level of FSH at the probability level ($P \leq 0.0001$) between the patient groups and the healthy group, as its level increased significantly in women with endometriosis (11.619 ± 0.479) and decreased significantly in women with endometriosis. In women with PCOS (7.624 ± 0.293) compared to its level in the healthy group (9.133 ± 0.247), it also decreased significantly in women with polycystic ovary syndrome compared to the group with endometriosis.

The statistical results also showed a significant difference in the level of the LH hormone between the patient groups and the healthy group at the probability level ($P \leq 0.0001$), which showed a significant decrease. Endometriosis (1.109 ± 0.318) in sick women compared to the healthy group, while its level increased in women with polycystic ovary syndrome (15.815 ± 0.289) PCOS compared to its level in the healthy group (6.925 ± 0.407) and those with endometriosis ($P \leq 0.0001$), as shown in the table (3)

Table (3) represents the levels of LH and FSH hormone concentrations and the t-test and p-value values for the two study groups.

Groups	FSH Mean \pm SD mIU/ml	LH Mean \pm SD mIU/ml
control group(15)	9.133 \pm 0.247b	6.925 \pm 0.407
Endometriosis	11.619 \pm 0.479a	1.109 \pm 0.318
polycystic ovary (30)	7.624 \pm 0.293c	15.815 \pm 0.289
p-value	<0.0001	P \leq 0.0001

The results of the current study for women with Endometriosis showed a significant decrease in their LH hormone levels, while their FSH levels increased compared to a group. These results were consistent with the results of a study (6).

The results of the study showed an increase in the level of LH and no significant differences in the level of FSH. This may be due to an imbalance in the secretion of the luteinizing hormone (LH) in relation to the follicle-stimulating hormone (FSH). The luteinizing hormone (LH) rises and the follicle-stimulating hormone (FSH) decreases (the LH/FSH ratio is more than 2.5 normal). (Which results in the failure of ovulation in the ovary and thus the egg to cyst and not be released, in addition to several other factors involved in the pathogenesis of polycystic ovary syndrome. (7) Indicated that the main mechanism of the syndrome is the abnormal secretion of gonadotropin, with an increase in the LH hormone in Circulation and low FSH. Also, excessive secretion of androgens by the ovaries and adrenal glands, which provide the substrate for peripheral levels of estrogen, also plays a role in the development of polycystic ovary syndrome (7) In addition, the patterns of FSH and LH secretion reflect the integration of complex signals sensitive to the hypothalamus, pituitary, and peripheral glands, and the amplitude and frequency of the GnRH pulse determine the physiological patterns of LH and FSH secretion, as a decrease in the frequency of the GnRH pulse enhances the amplitude of the LH pulse (8).

(9) Indicated in their research that women with polycystic ovary syndrome show a high average level of luteinizing hormone (LH), in addition to a high frequency of pulsatile LH secretion. The abnormally high LH pulsation frequency indicates a reflection of an overactive neural circuit in the secretion of gonadotropin hormone (GnRH).), which give a neuroendocrine basis either as etiology or in the phenotype of PCOS (13). A high pulse in the gonadotropin hormone (GnRH) leads to excessive secretion of luteinizing hormone (LH), which has effects on the production of androgen in the ovary and the development of eggs (10). The study agreed with the studies of Ali and Moran, in which they found no significant differences between the group of infected women. With the syndrome and insulin resistance and another group of women with the syndrome only. Moran suggested that the resistance to insulin and gonadotropins associated with polycystic ovary syndrome may be caused by other separate genetic diseases (11,12). Likewise, the current study with regard to the increase in LH levels is consistent with Alsaadi's findings regarding the increase in LH levels in women with polycystic ovary syndrome (13), which is likely to be due to an increase in androgens with a continuous increase in the pulse rate of gonadotropin-releasing hormone (GnRH).), which was related to androgen-induced resistance to the GnRH pulsation associated with negative feedback of progesterone, as this imbalance can lead to an excessive increase in LH secretion, which may also be responsible for ovarian androgen production and ovulatory dysfunction, which causes polycystic ovary syndrome in adults (14)

Conclusions

Disturbances in the level of sex hormones and nutrients for the gonads play a major role in causing pathological conditions that lead to polycystic ovary syndrome and endometriosis.

References

1. Deol, P. S. *ANATOMY PHYSIOLOGY OF FEMALE REPRODUCTIVE SYSTEM*. Blue Rose Publishers. 2023.
2. Al-Suhaimi, E. A., Khan, F. A., & Homeida, A. M. Regulation of male and female reproductive functions. In *Emerging Concepts in Endocrine Structure and Functions* (pp. 287-347). Singapore: Springer Nature Singapore (2022).
3. Rosenfield, R. L., Cooke, D. W., & Radovick, S. Puberty in the female and its disorders. In *Sperling Pediatric Endocrinology* (pp. 528-626). Elsevier (2021).
4. Richards, J. S. The ovarian cycle. *Vitamins and hormones*, (2018).107, 1-25.
5. Monisha, K... Study of Distribution of Musculature Pattern and Cilia in Different Regions of the Fallopian Tube (Doctoral dissertation, Thanjavur Medical College, Thanjavur) (2020).
6. Liang, Y.; Xie, H.; Wu, J.; Liu, D. and Yao, S. Villainous role of estrogen in macrophage-nerve interaction in endometriosis. *Reproductive Biology and Endocrinology*, 16(1), 1-11(2018)..
7. Balen, A. H., Tan, S. L., MacDougall, J., & Jacobs, H. S. (1993). Miscarriage rates following in-vitro fertilization are increased in women with polycystic ovaries and reduced by pituitary desensitization with buserelin. *Human Reproduction*, 8(6), 959-964.
8. Moran L, Noakes M, Clifton P et al. (2007): The use of anti- mullerian hormone in predicting menstrual response after weight loss in overweight women with polycystic ovary syndrome. *The Journal of Clinical Endocrinology and Metabolism*, 92(10): 3796–3802.
9. Coutinho, E. A., & Kauffman, A. S. (2019). The role of the brain in the pathogenesis and physiology of polycystic ovary syndrome (PCOS). *Medical Sciences*, 7(8), 84.
10. Ali, Ali El Shabrawy, Ahmad Nader Mohammed Mustafa, Ahmed Mohammed Baraka, and Mostafa Abdo Ahmed. 2022. "Frequency of Insulin Resistance among Infertile Women with Polycystic Ovary Syndrome at Zagazig University Hospitals." *Egyptian Journal of Hospital Medicine* 89(1):4573–77.
11. Alsaadi, Yasmin L., and Ban Jasim Mohamad. 2019. "Prevalence of Hyperandrogenism in Iraqi Women with Polycystic Ovary Syndrome." *Iraqi Journal of Science* 60(12):2600–2608.
12. Chhabra, S., McCartney, C. R., Yoo, R. Y., Eagleson, C. A., Chang, R. J., & Marshall, J. C. (2005). Progesterone inhibition of the hypothalamic gonadotropin-releasing hormone pulse generator: evidence for varied effects in hyperandrogenemic adolescent girls. *The Journal of Clinical Endocrinology & Metabolism*, 90(5), 2810-2815.
13. Malini, N. A., and G. K. Roy. 2021. "Influence of Insulin on Lh, Testosterone and Shbg in Various Pcos Categories Based on the Mode of Secretion of Lh in Relation To Fsh Levels." *Acta Endocrinologica* 17(3):313–18.
14. Zhang, K., Zhou, B., Zhang, P., Zhang, Z., Chen, P., Pu, Y., ... & Zhang, L. (2014). Genetic variants in NAMPT predict bladder cancer risk and prognosis in individuals from southwest Chinese Han group. *Tumor Biology*, 35, 4031-4040.