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Evaluation of hormones level in infertility women because of polycystic ovary syndrome

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Abstract--Background: Polycystic ovary syndrome refers to an endocrine disruption in affected women during reproductive age. Objective: The current study was undertaken with the objective of investigating the effects of LH, FSH, LH/FSH, prolactin, AMH, and testosterone of secretion and correlate PCOS subjects. Materials and methods: The study included infertile women infected with PCOS and healthy women aged (20-45) collected from May to July 2022 in Iraq. Among 60 women were studied, 40 infected women with PCOS (Patients group) and 20 healthy women (Healthy group) in this study. In all subjects, hormone levels of FSH, LH, AMH, Testosterone, and prolactin samples were taken and tested by VIDAS using commercial kit (BIOMERIEUX-France). Results: The result shown the levels of LH, LH/FSH ratio, AMH, Testosterone, and Prolactin in patient group of women infected with PCOS significant difference compared with control group, as LH, LH/FSH ratio, AMH, Testosterone, and Prolactin higher level in patient group compared with control group. But the levels of FSH in group of women infected with PCOS shown nonsignificant difference compared with control group with decreased nonsignificant in patient group compared with control group. Conclusion: We found a higher level in LH and LH/FSH, AMH, and Testosterone but FSH shown nonsignificant decrease in women with infertility leading to correlation these hormones with PCOS. So, importance of hormonal imbalance in women with PCOS may be lead to infertility.

Keywords---polycystic ovary syndrome, LH, FSH, prolactin, AMH, testosterone.

Introduction

Polycystic ovary syndrome (PCOS) refers to an endocrine disruption in affected women during reproductive age, with the disease rate ranging from 9 to 18%. The disease is mainly caused by a defect in ovulation, excess androgen in the circulatory system, as well as insulin resistance (Guleken *et al.*, 2021). PCOS theoretically is result from an abnormal reaction between various environmental, genetic and behavioral factors. The common clinical image of PCOS is huge of one or both ovaries, inflammation in theca cells and huge and also greater secretion of androgens than normal. Increased in secretion of androgen is result of the increased enzymatic activity, which is lead to steroid production (Saadia, 2020). It is characterized by hirsutism, infertility, insulin resistance, obesity, and menstrual irregularities (Nath *et al.*, 2019). Abnormalities of hypothalamic-pituitary-adrenal or ovarian axis imposed into the pathophysiology of PCOS, a disorder in the secretion of gonadotrophin releasing hormone (GnRH) lead to increase in Luteinizing Hormone (LH) to Follicle Stimulating Hormone (FSH) release. Estrogen of ovarian is responsible to an abnormal feedback mechanism lead to increase in LH released (Saadia, 2020). Also Higher prolactin can be due to pathological conditions and physiologic changes including polycystic ovary syndrome (Davoudi *et al.*, 2021).

According to negative pregnancy outcomes, like as miscarriage, hypertension associated to pregnancy and premature birth associated with PCOS. Many of studies have shown many of endometrial signs may attach with PCOS. Among those studies, inflammatory markers have rained more attention because the endometrium contain many of immune cells together with a cytokine and chemokine environment play an serve role in normal function of endometrial (Liu *et al.*, 2021). Considering the intermingling clinical features of PCOS, the current study was undertaken with the objective of investigating the effects of LH, FSH, LH/FSH, prolactin, AMH(Anti-Mullerian hormone), and testosterone of secretion and correlate PCOS subjects.

Materials and Methods

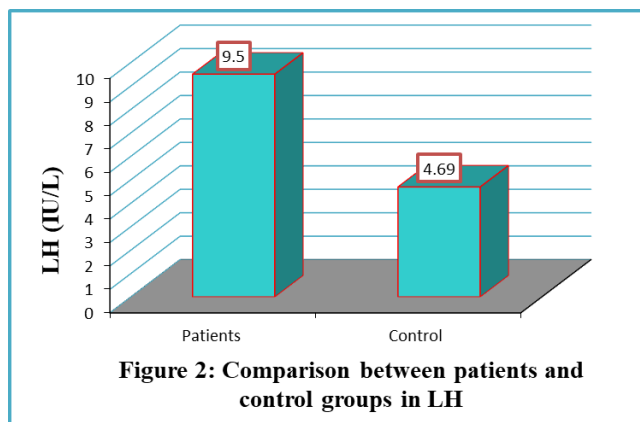
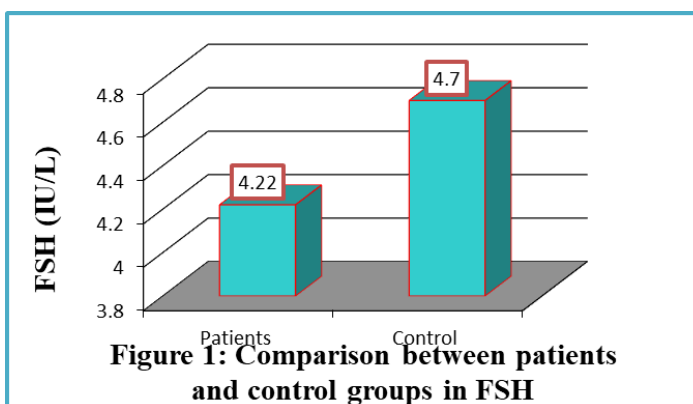
The study included infertile women infected with PCOS and healthy women aged (20-45). Collection of samples taken from May to July 2022 under the diagnosis of supervision gynaecologist based on laboratory results and clinical symptoms in Iraq. Among 60 women were studied, 40 infected women with PCOS (patient group) and 20 healthy women (control group) in this study. In all subjects, hormone levels of FSH, LH, AMH, testosterone, and prolactin samples were taken and tested by VIDAS using commercial kit (BIOMERIEUX- France) and compared results of infected group with healthy group. The result of study determined by using the Statistical Analysis System- SAS (2012) program was used to detect the effect of difference factors in study parameters. T-test (Analysis of Variation-ANOVA) was used to significant compare between means in this study at P value ($P \leq 0.01$).

Results

Table 1
Comparison between difference groups in FSH, LH and LH/FSH

Group	Mean $\pm$ SE		
	FSH (IU/L)	LH (IU/L)	LH/FSH ratio
Patients	4.22 $\pm$ 0.51	9.50 $\pm$ 1.68	2.315 $\pm$ 0.31
Control	4.70 $\pm$ 0.44	4.69 $\pm$ 0.32	1.155 $\pm$ 0.16
T-test	1.398 NS	3.535 **	0.734 **
P-value	0.487	0.0099	0.0033
** (P $\leq$ 0.01), NS: Non-Significant.			

As shown in table (1), the levels of LH (IU/L) and LH/FSH ratio in group of women infected with PCOS significant difference compared with control group, as shown higher level in patient group compared with control. But FSH (IU/L) shown in group of women infected with PCOS nonsignificant decreased in patient group compared with control group.



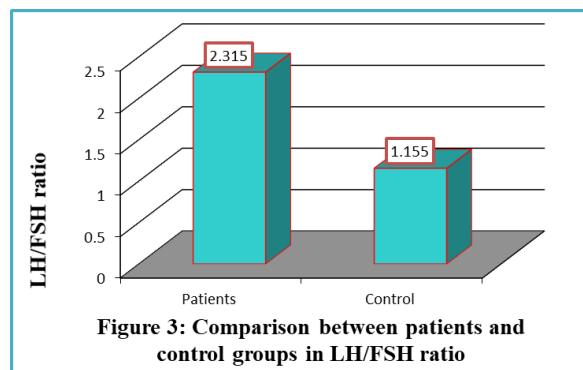
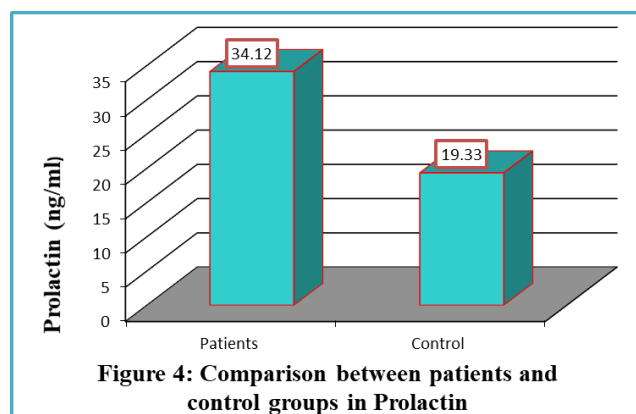
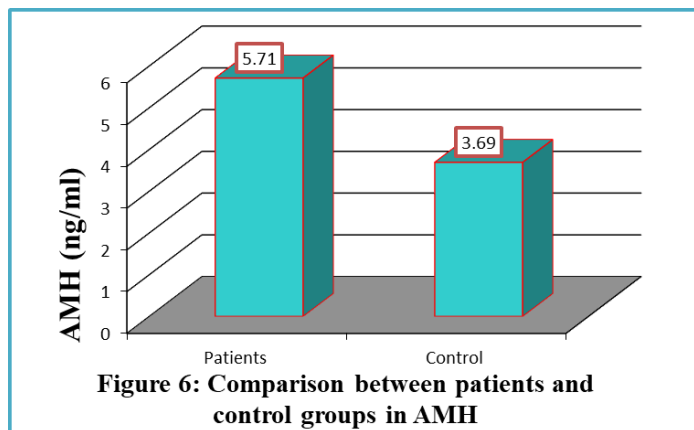
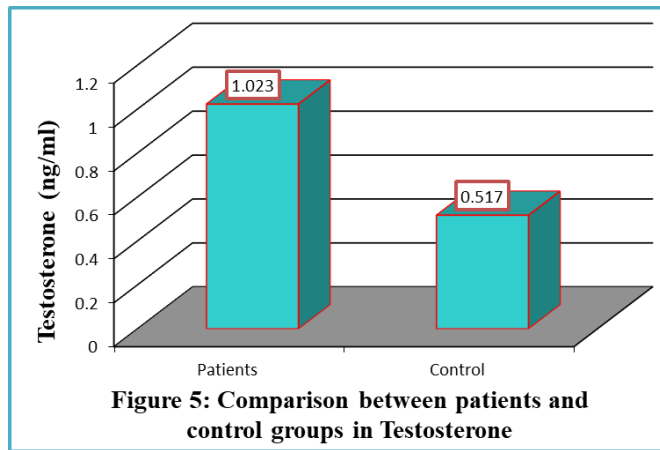


Table 2
Comparison between difference groups in Prolactin, Testosterone and AMH

Group	Mean $\pm$ SE		
	Prolactin (ng/ml)	Testosterone (ng/ml)	AMH (ng/ml)
Patients	34.12 $\pm$ 5.36	1.023 $\pm$ 0.14	5.71 $\pm$ 0.57
Control	19.33 $\pm$ 1.29	0.517 $\pm$ 0.03	3.69 $\pm$ 0.18
T-test	11.396 **	0.311 **	1.246 **
P-value	0.010	0.0027	0.0026
** (P $\leq$ 0.01).			

As shown in table (2), the levels of Prolactin (ng/ml), Testosterone (ng/ml) and AMH (ng/ml) in group of women infected with PCOS significant difference compared with control group, as shown higher level in patient group compared with control.





Discussion

PCOS is a topic of continuous research for new sights in pathogenesis and therapeutic method. The higher result of LH in women infected with PCOS causes by production of LH from adrenal axis or hypothalamic pituitary ovarian lead to disturbance in gonadotropin releasing hormone (GnRH). An abnormal feedback mechanism by estrogen of ovarian is blamed to act role in increase in LH secretion. But in contrast result showed insufficient levels of FSH caused weak follicular development, but increased levels of LH caused increased androgen of ovarian production. As a result of this disruption, the ratio between FSH and LH levels, usually around 2:1 (Nath *et al.*, 2019).

Other studies of patients with PCOS have minimum levels of FSH which lead to decrease the reserve of ovary (Holte *et al.*, 1994). On the contrary, the normal level of LH refer to ovary is active, but high level refer to failure the ovary or the menopause stage (Pakarainen *et al.*, 2005; Berinder *et al.*, 2007). FSH has a positive effect on estradiol and granulosa cells to secreting AMH, when the estradiol levels increased in large antral follicles, it has the capable to stop the secretion AMH, but in PCOS cases, the secretion of estradiol induced by decreased of FSH (AMH blocked the conversion of androgen to estradiol) (Azziz *et*

al, 2004), with an accompanied by high AMH lead to high level of small antral follicles in ovaries (Berinder *et al*, 2007).

Also, the study showed that higher prolactin in group of women infected with PCOS comprising with control and which confirmed with study of Davoudi *et al*, 2021. Higher prolactin is a part of PCOS, the abnormal hormonal environment or pathophysiology of PCOS may be cause increased in prolactin is a case of debate a wide research. The precise mechanism is still obscure, the theory of hyperestrogenemia in PCOS lead to prolactin secretions as considered responsible (Hassan, 2020). Other disagreed with these results and explained that prolactin level are normal in PCOS patients and the relations between PCOS and high prolactin level is only an accidental result (Szosland *et al*, 2015). This may be explained by the theioryrical that some PCOS pathogenesis connected to deficient hypothalamic dopaminergic activity, also responsible for raises LH/FSH ratio and thyroid stimulating hormone (Anthony *et al*, 1984). Furthermore, testosterone with high level in women infected with PCOS proposed that induced or genetic excess of testosterone may be the main cause of obesity relationship with PCOS (Khmil & Marushchak, 2020). Thus, our results are agreement with the recent studies and confirm the importance of hormonal evaluation for PCOS for evolution early to prevent long-term reproductive problems and infertility.

Conclusion

PCOS is refers to endocrine disorder that relationship with hormonal disorders. This indicates a close connection between pituitary axis and ovary. We found a higher level in LH and LH/FSH, AMH, and Testosterone but FSH shown nonsignificant decrease in women with infertility leading to correlation these hormones with PCOS. So, importance of hormonal imbalance in women with PCOS may be lead to infertility.

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