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Comparison of the Levels of LH and FSH, TSH, Prolactin, Progesterone and Estradiol Hormones between Iranian Infertile Women with Polycystic Ovary Syndrome and Healthy Women

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ABSTRACT

Polycystic ovary syndrome (PCOS) with the prevalence of 5 to 7% among Iranian women is a leading cause of infertility and endocrine disorder. Metabolic disorders such as increased levels of LH and FSH hormones in these patients was common and influences health of women with PCOS in long-term. Treatment of female infertility and other complications in many cases need to regulate hormones and receive exogenous hormone, and then the effect of female hormones on the disease is very important. In this study, levels of Luteinizing hormone (LH) and Follicle-stimulating hormone (FSH) and other female hormones among Iranian women with PCOS and infertility and healthy people were measured in this regard and values were compared. The result of this study showed that LH and progesterone hormone levels were significantly different in this syndrome than healthy women.

Keywords: Polycystic ovary syndrome, Endocrine disorders, Infertility, Luteinizing hormone, Follicle-stimulating hormone

INTRODUCTION

Polycystic ovary syndrome (PCOS) with frequency of 5 to 7% in Iranian women is considered as the most important cause of infertility and endocrine disorders (1). The cause of calling this syndrome is the presence of large ovaries containing many small cysts in the outer layer of each ovary (2).

The etiology of PCOS is unknown. It is associated with the increased secretion of androgens as constant protests. It seems that abnormal fuliculogenesis and steroidogenesis are the main causes of the disease. Metabolic disorders including increased serum levels of Luteinizing hormone (LH) and Follicle-stimulating hormone (FSH) is common in these patients and health of women with PCOS is deeply affected in the long term (3). Almost in 40% of women who have polycystic ovaries, the excess amount of LH is secreted. The risk of infertility and miscarriage increases in this group of patients. Hypersecretion of LH is created followed by hyposhysis-ovarian unsteroidic feedback dysfunction. Metabolic disorders including increased serum levels of LH, LH/FSH ratio and insulin resistance are common in this disease (4).

Ovum affects by gonadotroph hormones and developes while maturation of mammalian oocytesis controlled by under the pituitary hormones including FSH and LH. Both FSH and LH are needed for the development of the egg follicle. Follicle selected for ovulation has FSH initsantral liquid and the seleced folliclefor atresia does not receive adequate FSH for accomplishing the process of maturation. The follicles have fewer granulosa cells and in their follicular fluid androgen levels are more than estrogen levels, this process has relationship with follicular atresia in the evolution. Therefore, in the follicle development, dominant follicle causes the creation of an environment in which oocytes mature and is provided for the resumption of meiosis. Estradiol secretion level from granulosa cells in the follicle is to the extent that can stimulate LH secretion from the pituitary suddenly with a positive feedback, the sudden secretion of LH causes ovulation of follicle at time when it is matured. Estradiol produced by the same

follicle induces endometrial proliferation, and it provides the uterus to be fertilized in case of further development (5).

FSH plays a fundamental and irreplaceable role in reproductive control of women as a key hormone for the production and maturation of gonadal development during the reproduction and differentiation of its target cells by binding to its target receptor in granulosa cells. If there is a disruption in follicular maturation, then FSH activity will be impossible. FSH interaction with its receptor is crucial for the evolution and maturation of follicles. Any changes in the genotype of the receptor cause disruptions in its ability to bind to the FSH which leads to defects in the signaling pathways (6, 7). The cause of 75% of infertility is anovulation PCOS. The mechanism of anovulation in this syndrome is unknown until now. But there are evidences that a moratorium on the development of follicles in PCOS which is highly observed in women reflects disrupted function of the endocrine environment. Precocious puberty of many ovarian folliculesin polycystic ovaries has also been reported. Granulosa cells of these follicles are less sensitive to LH and their size is smaller than other follicles with normal cycle and producesabnormal amounts of estradiol due to their small sizes and ultimately inhibits FSH levels and hinders the healthy follicular maturation (8, 9).

Polycystic ovary shape is different and larger than normal ovaries and is almost 2 times of them contain growing follicles and stroma volume also increases. Theca cells that have been isolated from polycystic ovaries and in response to LH secret large and significant quantities of androstenedione and 17-hydroxyprogesterone from granulosa cells, but granulosa cells of polycystic ovaries, compared to normal ovaries, produce lower levels of estrogen (10).

Therefore PCOS should be considered as a syndrome having ovarian hyper activity caused by a genetic defect that leads to the ovarian control disorder on the ovarian internal processes and degree of symptoms, is influenced by factors outside ovarian (11, 12). Considering the increasing rate of patients with PCOS and infertility in modern societies, the importance of studying the effect of endocrine disorders is essential for the treatment of this disease. Therefore, in this study the levels of different hormones including LH, FSH, TSH, prolactin, estradiol, and progesterone in healthy women and women with PCOS and infertile women were compared.

MATERIALS AND METHODS

The study was conducted on patients with infertility affected polycystics ovary syndrome, infertility and healthy subjects referred to Shariati Hospital and infertility clinics during the period of 2014 to 2015. Diagnosis of disease was collected under the supervision of instructions of maternity doctors and according to the clinical signs and laboratory findings. Finally, among a total of 121 patients, 52 patients with polycystic ovary syndrome and infertility, 30 infertile patients, and 39 healthy subjects were investigated in this project. Blood samples were taken and level of various hormones including LH, FSH, TSH, estradiol, progesterone and prolactin were determined in all subjects and these values were compared in normal and infertile individuals.In this study, examinations were done and graphs were drawn in order to evaluate the results statistically using SPSS software. For all statistical analyses the significance level of p= 0.05 was considered as statistically significant.

RESULTS

A total of 121 cases, 52 women with PCOS and infertility, 30 infertile, and 39 healthy persons were investigated and compared in this project.Hormones including FSH and LH were studied and evaluated in the groups (Tables 1-3) (Figure 1-4).

Table 1. The clinical and biochemical characteristics of the patients and control group

The studied indicators	Patients with PCOS	Infertile patients	Control Group
Age	29.4 ± 4.9	30.8 ± 3.9	27.2 ± 4.2
FSH Level	7.1 ± 3.7	7.2 ± 3.5	6.4 ± 1.95
	p-value = 0.155 (pcos and infertile comparison to control)		
	p-value = 0.509 (pcos and infertile and control comparison togthers)		
LH Level	8.3 ± 7.1	5.1 ± 2.9	5.4 ± 1.31
	P-value = 0.019 (pcos and infertile comparison to control)		
	P-value = 0.004 (pcos and infertile and control comparison togthers)		
Estradiol Level	43.8 ± 35.1	49.7 ± 18.65	-
	P-Value = 0.393 (pcos and infertile comparison togthers)		
Prolactin Level	325.1 ± 257.9	296.7 ± 232.3	-
	P-Value = 0.62 (pcos and infertile comparison togthers)		
Progesterone Level	5.59 ± 5.45	10.5 ± 8.65	-
	p-value = 0.007 (pcos and infertile comparison togthers)		
TSH Level	2.6 ± 1.7	2.5 ± 1.2	-
	P-Value = 0.693(pcos and infertile comparison togthers)		
Cycle Length	26.7 ± 2.5	27.1 ± 3.3	28.5 ± 2.6

Table 2. Examine the relationship between the amount of progesterone in healthy and infertile women with polycystic ovary syndrome

	t-test for Equality of Means		
	Sig. (2-tailed)	Mean Difference	Std. Error Difference
PROGESTERONE Equal variances assumedEqual variances not assumed	0.002 0.007	-4.95558 -4.95558	1.55630 1.75106

The results demonstrated a significant relationship between the amount of progesterone in healthy women and infertile women with polycystic ovary syndrome.

Table 3. Studying FSH and LH hormones in the studied groups

		Sum of Squares	df	Mean Square	F	Sig.
FSH	Between Groups	14.176	2	7.088	0.679	0.509
	Within Groups	1231.677	118	10.438		
	Total	1245.853	120			
LH	Between Groups	277.159	2	138.580	5.663	0.004
	Within Groups	2887.507	118	24.470		
	Total	3164.666	120			

P-value for the amounts of FSH and LH in the studied groups showed a significant difference in LH levels.

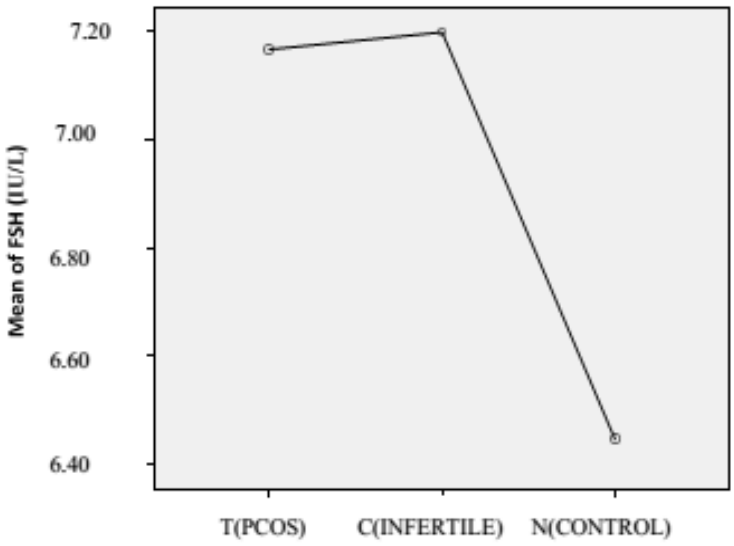

Figure 1. The level of FSH in the studied groups

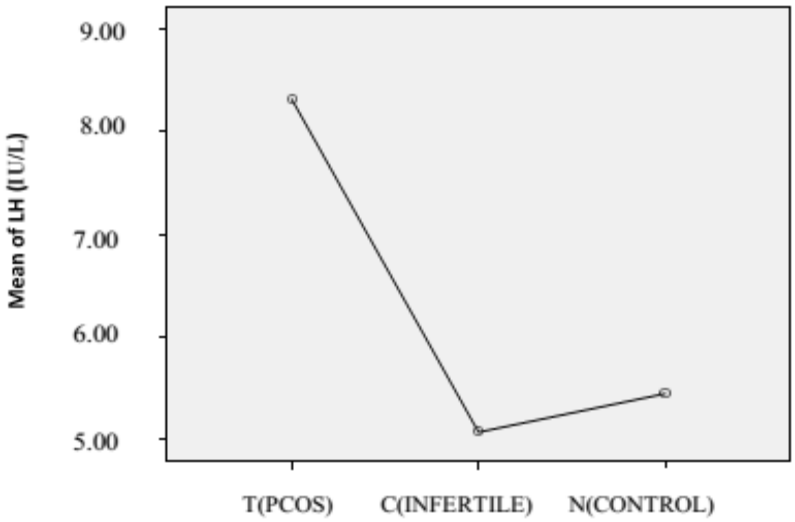

Figure 2. The level of LH in the studied groups

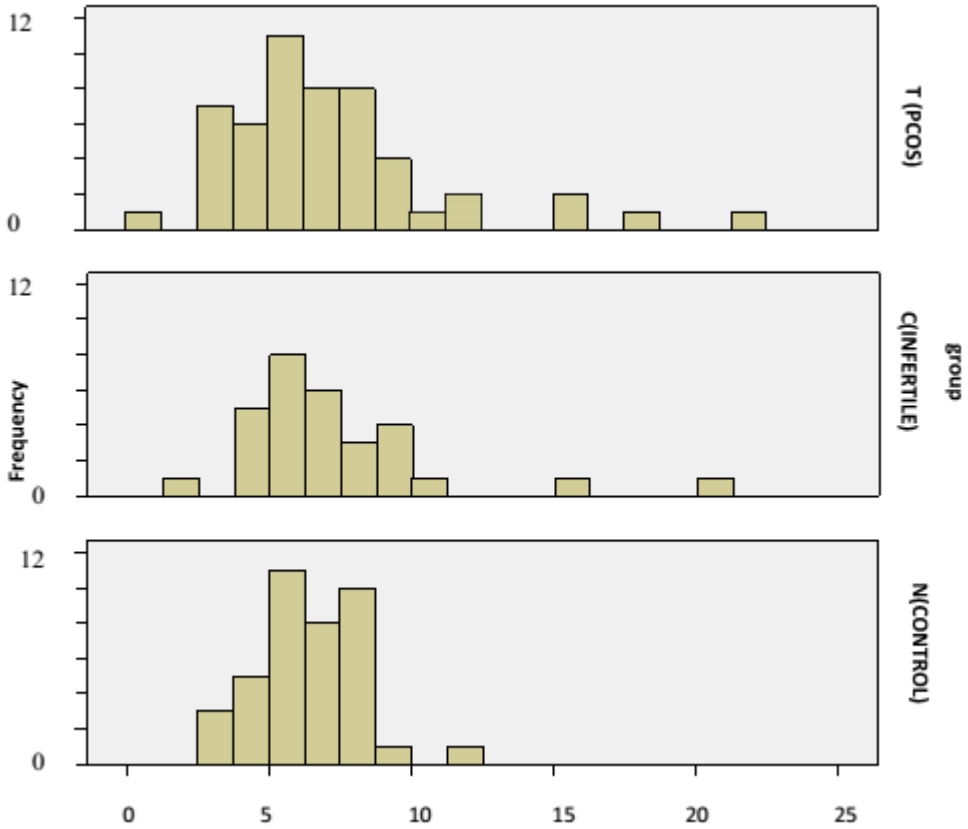

Figure 3. The comparationof the FSH level between the studied groups based on the distribution of patients according to hormone level

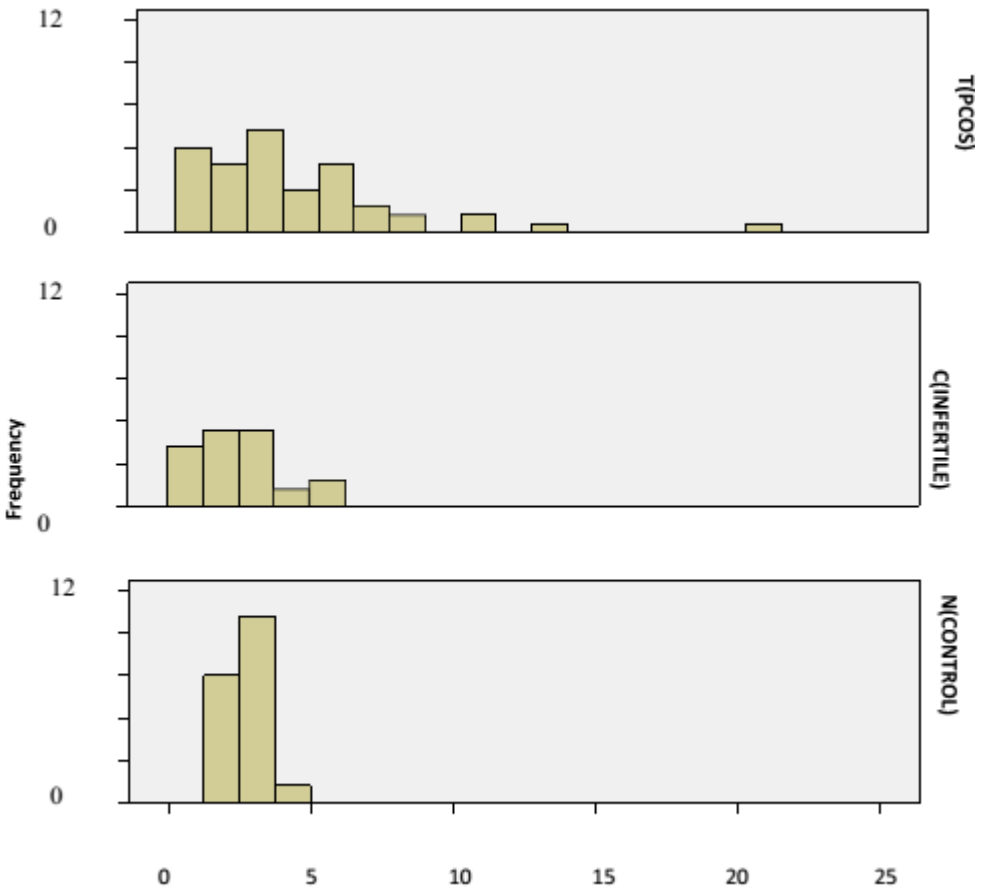

Figure 4. The comparation of LH levels between studied groups based on the distribution of patients according to hormone level

Reviewing FSH and LH hormones in the studied groups and the P-value showed that there was significant difference in LH levels.

The overall results revealed no significant difference in levels of FSH, TSH, Estradiol, progesterone, and prolactin in infertile women with PCOS and healthy women.

DISCUSSION AND CONCLUSION

Taylor et al. (1997) reported an elevated LH and LH to FSH ratio. Seventy five percent of the PCOS patients had an elevated pool LH level and 94% elevated LH to FSH ratio (13). Joanne et al. (1987) showed that in the women with PCOS both the amplitude and frequency of LH secretion are increased compared to those in normally cycling women throughout the follicular phase and increased secretion of LH as well as the relative suppression of FSH (14). Pastore et al. (2011) observed no difference between the true and sham acupuncture protocols for the women with PCOS so that both groups had a similar improvement in their LH/FSH ratio (15). Pastor et al. (1997) suggested the level of plasma LH is elevated in women with PCOS (16). Cook et al. (2002) demonstrated that women with PCOS had higher serum LH level than the peer normal women (17). All of the aforementioned studies have indicated an elevated LH level among women with PCOS.

In this study, a total of 121 peripheral blood samples were examined from three groups of infertile women with polycystic ovary syndrome, infertile, and control. Blood samples of studied subjects in this thesis were collected from Shariati infertility centers and others sterility centers. The study was conducted on reproductive age ranges andthe relationship between different hormones of polycystic ovary syndrome with different levels of the female hormones including LH, FSH, TSH, estradiol, progesterone and prolactin was examined.

Given the high prevalence of infertility in couples around the world, one of the early experiments in the study of infertility, is measurement of female sex hormones.Abnormal levels of sex hormones are commonly seen and do not necessarily mean being infertile. Due to the importance of PCOS and usingvitro fertilization by a lot of these people in one hand, and on the other hand, with respect to the involvement of different genes in the pathogenesis of the

disease and how to respond to exogenous hormones, the importance of further study of these hormones has been increased in order to treat their infertility.

In this study, the results of the LH hormone levels in the study groups revealed significant difference between the infertile group and polycystic ovary syndrome infertile groups through the analysis (P = 0.004). In a study on the infertile group compared with the control group, significant difference was observed in levels of LH hormone (P= 0.019). Statistical analysis of other hormones between infertile women with polycystic ovary syndrome and infertile groups, progesterone hormone showed a significant difference between the two groups (P= 0.007). It is suggested to future studies examine different genes of FSHR (receptor of FSH hormone) and protein of this gene in women undergoing in vitro fertilization treated with FSH. Additionally, evaluation of the expression of FSH receptor simultaneously with changing the dose of FSH in vitro fertilization, studying the relationship between partial and complete moles and other disorders including infertility because of their association with maternal meiotic errors, review of 22q chromosomal deletions and its association with infertility, and infertile patients with polycystic ovary syndrome gene therapy methods have been suggested.

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