

# Comparative Study of Hormonal and IL-6 Levels Among Infertile Women With Polycystic Ovary Syndrome and Healthy Women

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## ABSTRACT

**Background:** The most common endocrine illness that affects older women with childbearing age is Polycystic ovary syndrome (PCOS). The prevalence ranges from 8%-13% according to the definitions used and residents utilized.

**Materials and methods:** Illness with the infertile ovarian syndrome and a medical referral were studied to Al Hussain Educational Hospital to the infertility center during the period from August to November 2017. The diagnosis of the illness was serene under the supervision of gynecologists and according to clinical indications. Laboratory discovery. This project investigated 80 healthy people and 90 illness with polycystic ovary syndrome. Hormone levels, including prolactin, TSH, FSH and TSH, and blood samples were measured, and the IL-6 level concentration was examined.

**Results:** Results exemplify that there was no important alteration between illness and controls regarding age, TSH, and prolactin, while the LH and estradiol were suggestively advanced in illness in comparison to controls, P-value <0.001. The FSH and progesterone were suggestively lesser in illness as compared to controls, p-value  $\leq 0.001$ . Results displays that there was an important difference of IL-6 altitudes in illness comparison to controls, P-value < 0.001.

**Conclusion:** This indicates the close connotation between the ovary and pituitary axis. The polycystic ovary syndrome is an inflammatory illness that will lead to the rise of many inflammatory cytokines such as; IL-6.

**Keywords:** FSH, IL-6, Infertile, LH, Polycystic ovary syndrome, Prolactin, TSH.

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## INTRODUCTION

The most common endocrine illness that affects older women with childbearing age is polycystic ovary syndrome (PCOS). The prevalence ranges from 8%-13% based on the studied population and the used definitions.<sup>1,2</sup>

The illness, which suffers from polycystic ovarian illness (PCOD), has many small cysts in the ovaries (poly means a lot). These bags occur when regular changes in the normal menstrual cycle are interrupted. The ovary is distended; it produces excess amounts of androgen and estrogen. This excess, with no ovulation, may cause infertility. Other names of PCOD are polycystic ovary syndrome (PCOS) or Stein-Leventhal syndrome.<sup>3</sup>

Oocytes affect gonadal hormones and produce during maturation of eggs (mammalian) controlled by pituitary hormones, including FSH and LH. Both FSH and LH are needed to progress egg follicles. The follicles selected for ovulation have inessential FSH liquid, and the follicle selected for the lamination does not accept enough FSH to complete the maturation process. The follicles contain fewer granular cells, and the levels of androgens in the follicular fluid are more than the levels of estrogen. This relationship

has a gravitational defect in development. Therefore, in the development of follicle, the predominant follicle creates an environment in which the oocytes are developed and are prepared for resuming mitosis. At the time of maturation, LH causes follicle's ovulation. Endometrial proliferation is induced by the same follicle that forms estradiol, and it fertilizes the uterus for further improvement.<sup>4</sup> So, this study was planned to determine the status of hormones, *i.e.* (LH, FSH, Prolactin, and estradiol) between polycystic women and normal ovulation.

Women with PCOS are prone to being non-fertile and early pregnancy loss. Many are overweight, have trouble losing weight, and suffer from fatigue, depression, and anxiety. There is an important overlap in signs between PCOS and thyroid illness, although they are completely different. The impaired thyroid dysfunction associated with it is adversely affected. Both as autonomous risks of ovarian failure and complications associated with pregnancy.<sup>5</sup>

Data exposed that IL-6 is a major mediator and is concomitant with many illnesses in women with PCOS. Therefore, IL-6 may be essential equipment to diagnose PCOS, T2DM, and cardiovascular illness in PCOS women. However, the results of recent studies of changes in IL-6 levels in illness

PCOS are inconsistent. Although some reported studies discussed the important rises in IL-6 levels in women with PCOS compared to controls,<sup>6</sup> they have not been confirmed in similar studies,<sup>7</sup> with some studies indicating low echelons of IL-6.<sup>8</sup>

## MATERIALS AND METHODS

The subject of the study was infertile patients affected with polycystic ovary syndrome and the healthy subjects referred to Al-Hussain Teaching Hospital from August to November 2017. The collection of diagnosis with the gynecologists' supervision was done on the laboratory findings and clinical symptoms. A total of 90 patients with POS and 80 healthy subjects were studied among 170 people in this study. In all subjects, various hormone levels of FSH, TSH and LH and blood samples, and prolactin were taken and studied the attitude and concentration of IL-6. It was also compared with normal individuals. The tests were conducted in this study to determine the results statistically by applying the SPSS software. The consequence level of  $p < 0.05$  was considered as important for all the statistical analyses.

## RESULTS

170 cases of 90 female infertile patients with polycystic ovaries, and 80 healthy and comparable people in the study. Prolactin, LH, FSH, TSH, estradiol, and progesterone are the hormones that were studied and evaluated in groups.

Table 1 represent the biochemical attributes of the studied groups. The mean age of female patients in this study was  $29 \pm 4.5$  for the control group and  $28 \pm 4.7$  for infertile patients with POS. The results showed that there was no important difference between poor and controls with respect to age, TSH, and prolactin, while LH and estradiol were higher in case of poor comparison with controls,  $P$ -value  $< 0.001$ . FSH

and progesterone were less important in comparison to poorly controls,  $p$ -value  $\leq 0.001$ .

The relationship between the hormonal levels found in infertile women and their mean duration of infertility is presented in Table 2.

Also exposed, high IL-6 levels were associated with women Polycystic Ovary Syndrome and control group, as shown in the Table 3. Results show that there was significantly different of IL-6 levels in illness as compared to controls,  $P$ -value  $< 0.001$ .

## DISCUSSION

Our results exposed that prolactin levels were within normal levels for test groups, and no important differences were to be found as compared with a control group. This corresponds with Ramanand *et al.*,<sup>9</sup> who was attributed to the fact that illness in this study was within the normal weight. The pituitary gland hormones that are linked to all the process of ovulation and menstruation cycle, including FSH and LH, were measured in this study. Levels of LH and FSH are generally applied for predicting the reserve of ovary in the early phase of follicle even though they have a minimum value of prediction.<sup>10</sup> FSH hormone was importantly ( $p \leq 0.001$ ) lower in infertile illness with polycystic ovarian syndrome than in control subject. Schmidt *et al.*<sup>11</sup> exposed that all the female patients of PCOS had gone through resection of wedge, which would decrease the reserve of ovary. Other studies of premenopausal female patients of PCOS have also shown minimum levels of FSH in the illness of PCOS in comparison to age-matched controls would decrease the reserve of the ovary.<sup>12,13</sup> On the contrary, LH hormone was importantly ( $P \leq 0.001$ ) higher than control subjects. The normal equal of LH indicates that the ovary is active, but high number indicates failure of the ovary or the menopause stage of the woman.

**Table 1:** The clinical and biochemical characteristics of the illness and control group

The studied indicators	Infertile Illness with PCOS	Control Group	P value
Age	$28 \pm 4.7$	$29 \pm 4.5$	0.8
Prolactin(ng/ml)	$18.1 \pm 6.4$	$18.2 \pm 4.4$	0.9
FSH(mIU/ml)	$4.1 \pm 1.5$	$8.3 \pm 6.08$	0.001
LH(mIU/ml)	$7.8 \pm 4.5$	$5.2 \pm 2.1$	0.000
TSH(	$2.3 \pm 1.4$	$2.1 \pm 0.9$	0.8
Estradiol (pg/ml)	$159.6 \pm 16.7$	$45.5 \pm 20.43$	0.001
Progesterone (nmol/L)	$6.57 \pm 5.63$	$40.56 \pm 7.81$	0.001

**Table 2:** Hormonal level according to the duration of infertility

Hormone	Duration (years)			p-value
	< 2	2-5	>5	
Prolactin(ng/mL)	$2.4 \pm 1.7$	$2.4 \pm 1.2$	$2.2 \pm 1.2$	0.8
FSH(mIU/mL)	$4.0 \pm 1.4$	$4.1 \pm 1.4$	$4.1 \pm 1.9$	0.9
LH(mIU/mL)	$9.1 \pm 6.1$	$7.8 \pm 2.8$	$6.2 \pm 3.4$	0.09
TSH(	$16.9 \pm 5.7$	$19.9 \pm 9.0$	$17.4 \pm 10.2$	0.4
Estradiol (pg/mL)				
Progesterone (nmol/L)	14.85	16.34	19.12	

**Table 3:** Shows IL-6 levels in PCOS illness compared control group.

The studied indicators	Infertile Illness with PCOS	Control Group	p-value
IL-6	$139.7 \pm 8.9$	$98.6 \pm 7.4$	0.7

On the other hand, the low level of LH indicates a lack of secretions by the pituitary gland in general.<sup>14,15</sup> Estradiol levels importantly better in PCO illness ( $P \leq 0.001$ ). In the humane ovaries, with the growth of the follicles, AMH progressively decreases, and AMH vanishes when the follicles obtain the dominant size.<sup>16</sup> FSH has a positive impact on estradiol (E2), and granulosa cells for secreting AMH, when the levels of estradiol (E2) increase to a specific threshold in large antral follicles, it has the capacity to stop the secretion of AMH completely, but in terms of PCOS, the secretion of E2 induced by the shortage of FSH {AMH to block the rate of conversion of androgen to estradiol (E2)}.<sup>17</sup> It is accompanied by high AMH generated by the high level of small antral follicles in ovaries.<sup>15</sup> Also, AMH decreases the sensitivity of FSH in granulosa cells.<sup>18</sup>

Progesterone levels were importantly lower ( $P \leq 0.001$ ) in PCO illness in comparison to control group. Some studies suggested that progesterone has a complicated part in implementing and developing normal pregnancy. It was noted that progesterone's minimum exposure might cause infertility in serious cases or mildly re-occur loss of pregnancy.<sup>19,20</sup> Progesterone and estradiol prepare the endometrium to obtain the fertilized egg. The same progesterone supports the endometrium so that it is not shed during pregnancy.<sup>21-23</sup>

The symptoms of low level of chronic inflammation in PCOS are recommended by the presence of various increased markers, such as; inflammatory cytokines (IL-6)<sup>6</sup> The immune system is pretentious by estrogen/progesterone.<sup>7</sup> Illness with PCOS suffer from little progesterone due to speech or ovulation. Therefore, the immune system can be more than excess estrogen leading to the production of antibodies in this illness.<sup>8</sup> Various pathways associated with the impacts of estrogen on the immune system stimulates the formation of estrogen of IL-4 in Th2 lymphocytes, IL-1 in monocytes, IL-6 in T lymphocytes and interferon in Th1 cells. Progesterone can inhibit the effect of estrogen activation on the immune system.<sup>24</sup>

## CONCLUSION

PCOS is an endocrine disorder that accompanies multiple hormonal disorders that may lead to important hormonal hyperplasia and reduce other groups. This shows a close link between the pituitary axis and the ovary. Polycystic ovary syndrome is an inflammatory illness that results in the emergence of many inflammatory signs in the body, including the rise of inflammatory cytokines such as interleukin 6, which shares the immune system and its impact on the production of progesterone.

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