

Prostate Specific Antigen in Polycystic Ovary Syndrome

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ABSTRACT:

BACKGROUND:

Polycystic ovary syndrome (PCOS) is the most common cause of hyperandrogenism, and anovulatory infertility; it affects 5-10 % of females at their reproductive age. Prostate specific antigen is a glycoprotein that is secreted from the prostate in males and from paraurethral glands and breast in female.

OBJECTIVE:

To evaluate the total and free prostate specific antigen levels in female with PCOS, and find out its relation with FSH, LH, Prolactin and testosterone (F,T).

METHODS:

Eight patients with PCOS diagnosed based on three criteria

* High LH: FSH ratio; LH luteinizing hormone to FSH follicle stimulating hormone is 2:1 or more particularly in the early phase of menstrual cycle (3-6) day.

* Ultrasound reveals polycystic ovaries

* Biomedical hyperandrogenism. ; Elevated androgens particularly free testosterone.

Forty normal fertile females served as a control group in this study .

Blood samples were taken from all individuals from 3-6 day of menstrual cycle to measure total and free prostate specific antigen, total and free testosterone (by enzyme linked immunosorbent assay) and FSH,LH, Prolactin (by Immunoradiometric assay).

RESULTS:

Patients with PCOS and controls differed significantly in all parameters studied, except FSH ($P > 0.05$).

LH and LH: FSH ratio were significantly elevated in PCOS group compared to normal control group (11.9 ± 5.4 vs. 7.0 ± 0.6) and (2.3 ± 1.1 vs. 1.2 ± 0.1) respectively.

Total and free testosterone were significantly elevated in patient with PCOS compared to normal control group (50 ± 9.6 vs 24 ± 3.4) and (8.9 ± 1.0 vs 1.9 ± 0.4) respectively .

Total and free PSA significantly elevated in patient with PCOS compared to normal control group (1.2 ± 0.4 vs 0.1 ± 0.02) and (0.04 ± 0.01 vs 0.01 ± 0.003) respectively.

Positive correlation between T-PSA, F-PSA and T-testo, F –testo

CONCLUSION:

Total and free serum prostate specific antigen levels are higher in patient with PCOS.

Serum PSA measurement might be marker of hyperandrogenism in females suffering from PCOS.

KEY WORDS: prostate specific antigen, polycystic ovary syndrome, hyperandrogenemia

INTRODUCTION:

Polycystic ovarian syndrome

PCOS endocrine disorder is association of hyperandrogenism with chronic anovulation⁽¹⁾. Hyperandrogenism is characterized clinically by hirsutism, acne, and androgen dependent alopecia and biochemical by elevated serum concentration of androgens particularly testosterone and androstenedione. Obesity is common but not

universal (fig. 1)⁽²⁾. These features are associated with hyper secretion of LH with normal or low serum concentration of FSH⁽³⁾. The criteria for a diagnosis of PCO on ultrasonographic data include bilateral ovarian enlargement >9 cc diameter, 10 or more follicles, 2 to 10 mm in diameter per ovary and increased density and area of stroma⁽³⁾. LH increased because of either increased hypothalamus GnRH (gonadotropin releasing hormone) secretion or increased pituitary sensitivity to GnRH: Increased LH level promotes androgen secretion^(4,5,6,7).

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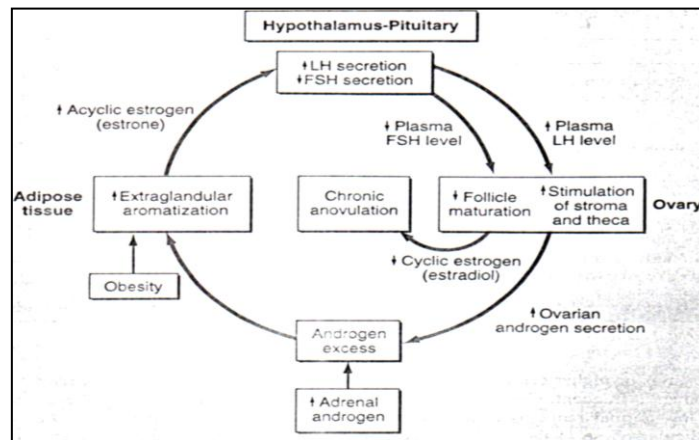


Figure 1: Proposed mechanism for the initiation and perpetuation of chronic an ovulation in PCOS. This cycle may be entered or initiated via adrenal androgen excess or obesity, both of which result in enhanced extraglandular formation of estrogen ⁽⁴⁾.

Prostate specific antigen

PSA single chain, glycoprotein, 7-10 % carbohydrate contents, isoelectric point at PH 6.8-7.5, 240 amino acid, five isoform ⁽⁹⁾. PSA which is a serine protease with trypsin and chymotrypsin like activity. It is a well known tumor marker for diagnosis and management of prostate cancer. PSA produced in male tissues especially in prostate. Function of PSA is to liquefy the sperm entrapping seminal coagulum after ejaculation and increasing sperm motility. PSA has been detected in some female tissues and body fluid. Periurethral gland was the first female tissue that was suggested to be able to produce PSA it is homologous to that of the male prostate ⁽¹⁰⁾. The gene expression and protein production of PSA in nonprostatic tissues are under the regulation of steroid hormones via their receptors. Androgens, glucocorticoids and progestin regulate the PSA gene expression. Estrogen by itself seems to have no effect on PSA regulation but it can impair PSA production ⁽¹²⁾. Because of the relationship between PSA production and androgen regulation, PSA may be a marker of androgen action in women. Women with higher levels of androgen may have higher levels of PSA ⁽¹³⁾.

MATERIAL AND METHODS:

Eighty women in their reproductive age (20-40) years old, who had been diagnosed as PCOS, were recruited from infertility clinic population of

KAMAL AL- SAMRI hospital. They were seen in time period from November 2005 till March 2006. PCOS was defined as anovulatory infertility and patient matched the revised 2003 criteria in which PCOS is diagnosed if there are any two of the following: - (2 out of 3) ⁽⁸⁾

- ❖ Female with irregular menstrual cycle.
- ❖ Clinical (hirsute, acne, alopecia) or biochemical hyperandrogenism.
- ❖ Presence of polycystic ovaries on ultrasound examination.

Forty apparently healthy fertile women were served as control. Those who were matched for age and with regular menstrual cycle and normal ultrasound.

Venous blood samples were aspirated at 8:00-10:00 am during 3rd – 6th day of menstrual cycle (early follicular phase) for those of normal cycle. For patient with anovulation or oligomenorrhea blood samples were collected regardless to the duration of the cycle. Blood samples were collected into plain tube and centrifuged within 30 min of collection. Serum was aspirated, and stored at -18 °c until time of assay.

RESULTS:

The clinical, anthropometric, hormonal and metabolic variables in women with PCOS (n=80) and controls (n=40) are shown in table (1).

PROSTATE SPECIFIC ANTIGEN IN POLYCYSTIC OVARY SYNDROME

Table1: Hormonal profile and PSA in females with PCOS and normal control

Characteristics	PCOS	Control	P value
Number	80	40	
Age (years)	28±6.3	27±3.4	0.3 NS
Menstrual cycle (days)	Irregular, Oligomenorrhea , Amenorrhea	Regular 27±6	
BMI (kg/m2)	29.3±7.3	22.6±2.7	< 0.05
WHR	0.80±0.08	0.72±0.05	<0.05
FSH (mIU/ml)	5.4±1.5	5.8±0.5	>0.05
LH (mIU/ml)	11.9±5.4	7.0±0.6	<0.05
LH/FSH ratio	2.3±1.1	1.2±0.1	<0.05
Prolactin (uIU/ml)	282±85	177±32	<0.05
T-Testo (ng/ml)	50±9.6	24±3.4	<0.05
F-Testo (pg/ml)	8.9±1.0	1.9±0.4	<0.05
T-PSA (ng/ml)	1.2±0.4	0.1±0.02	<0.05
F-PSA (ng/ml)	0.04±0.01	0.01±0.003	<0.05

Results are expressed as the mean ± SD.

P value consider significant when it <0.05.

BMI body mass index, WHR west hip ratio, FSH follicle stimulating hormone, LH luteinizing hormone

T- testo testosterone, F –testo free testosterone ,T- PSA total prostate specific antigen, F-PSA free

prostate specific antigen. P<0.05 was considered statistically significant (fig 2,3,4,5).

There is positive correlation between T-PSA and T-testo. , F-PSA and T-testo , T-PSA and F-testo. F-PSA and T-PSA

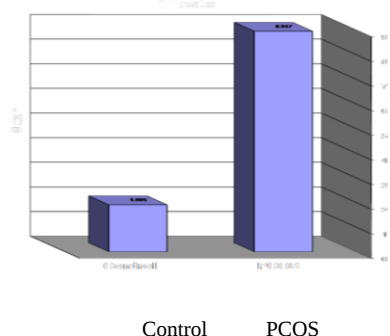


Fig 2: Mean values for free testosterone in PCOS patients and control group

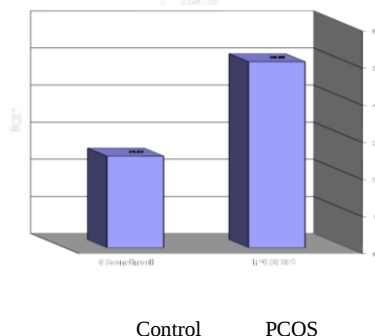


Fig 3: Mean values for total testosterone in PCOS patients and control group

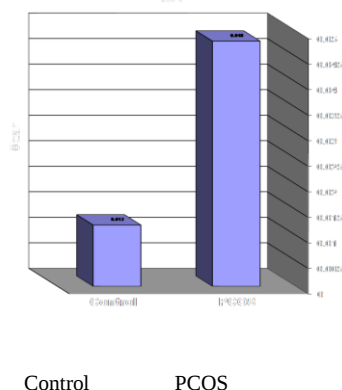


Fig 4: Mean values for free PSA in PCOS patients and control

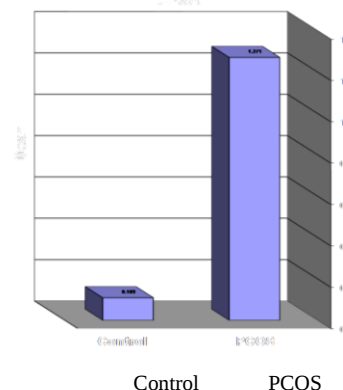


Fig 5: Mean values for total PSA in PCOS patients and control

DISCUSSION:

Different studies found that PSA level higher in hirsute women than control

In this study serum PSA level shows higher in patient with PCOS compared to the normal control. Patient had elevated Prolactin, T-testo, F-testo, LH and LH:FSH ratio they fit the criteria for diagnosis of PCOS and that was agreement with different studies and Iraqis studies^(11,12).

Increase in serum PSA is mainly related to the degree of hyperandrogenism. Women who are treated with testosterone over prolonged period of time will have significantly increased in PSA^(13,14) and administration of androgens or progestin to the patient cause significant elevated of PSA in urine, serum and tissues. Hirsute women without hyperandrogenemia PSA value were not different from control^(15,16). Androgens may play an important role in the secretion of PSA in women.

CONCLUSION:

Elevated Serum total and free PSA in patients with PCOS. PSA could be used as additional marker for hyperandrogenemia.

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