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STUDY OF SERUM PROSTATE SPECIFIC ANTIGEN (PSA) LEVELS AS A DIAGNOSTIC AND A BIOCHEMICAL MARKER IN PATIENTS WITH POLYCYSTIC OVARIAN SYNDROME (PCOS)

Biochemistry

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ABSTRACT

Background: PCOS is a reproductive endocrine disorder marked by oligo-ovulation/chronic anovulation, menstrual abnormalities, hyperandrogenism, and obesity. In females with PCOS, PSA has been identified as a potential new marker.. PSA may be a useful clinical marker and maybe a novel diagnostic criterion for hyperandrogenemia in females, despite the fact that its significance in PCOS patients is undetermined. **Objectives:** To evaluate and establish the role of PSA in association with elevated levels of androgens and altered LH/FSH ratio as a biochemical marker in aiding the diagnosis of PCOS. **Methods:** A total of 100 patients divided into 2 groups of 50 each, In Group A 50 patients diagnosed with PCOS and in Group B 50 Healthy patients without PCOS were analyzed for serum PSA, testosterone, prolactin, TSH, FSH and LH levels. **Results:** In the PCOS group, there was a slightly negative correlation with age, positive correlation between serum total testosterone and PCOS, and a moderately positive correlation with Ferriman - Gallwey score (FGS) for hirsutism. **Conclusion:** In females with PCOS, serum PSA levels increased significantly and were positively correlated with total testosterone and FGS score, while being negatively correlated with age. As a result, serum PSA levels in females with Polycystic ovarian syndrome can be used as a diagnostic and biochemical marker for PCOS and other hyperandrogenic disorders.

KEYWORDS

PSA, PCOS, Hirsutism, Androgens

INTRODUCTION

PCOS (polycystic ovarian syndrome) is a varied and complicated illness with negative reproductive and metabolic consequences. It is the most prevalent cause of hyperandrogenemia in females of reproductive age.[1] Infertility, endometrial cancer, and a variety of metabolic illnesses, such as insulin resistance, diabetes mellitus, hypertension, and cardiovascular disease, are all more common in these individuals.[2] Various studies have found a prevalence rate of PCOS ranging from 5% to 20% among females of reproductive age.[3] Polycystic ovaries affect the majority of anovulatory females. As a result, a surrogate serum marker that is specifically indicative of PCOS has long been tested.

PSA is a 33-kDa serine protease that is largely produced by prostatic tissue and discharged into the seminal fluid.[4] PSA is a very specific and helpful marker of prostate cancer in terms of disease screening, diagnosis, and monitoring. PSA has been found in a range of female tissues and fluids, including the breast, ovary, milk, endometrium, and amniotic fluid, thanks to the recent advent of ultrasensitive tests. However, the primary source of serum PSA in females is uncertain, while some writers speculate that it is generated by periurethral glands, which are remarkably similar to the prostate gland in males. PSA gene expression and protein synthesis in non-prostatic tissues are controlled by steroid hormones through their receptors.[5] PSA gene expression is regulated by androgens, glucocorticoids, and progestins. Estrogen has little influence on PSA control by itself, although it can hinder its production. PSA level has been reported to have a good specificity and sensitivity as a PCOS diagnostic test.[6] The amount of serum PSA remains consistent throughout the menstrual cycle, with less intracyclic changes. PSA level has been reported to have a good specificity and sensitivity as a PCOS diagnostic test. The amount of serum PSA remains consistent throughout the menstrual cycle, with less intracyclic changes.

MATERIALS AND METHODS

Study Design: Randomized Case control Study

Place Of Study: Samples were collected at Government Maternity Hospital, petla burj, and samples were analyzed at Osmania General Hospital, Afzalgunj Hyderabad.

Sample Size: A total of 100 patients divided into 2 groups of 50 each, In Group A 50 patients diagnosed with PCOS and in Group B 50 Healthy patients without PCOS were analyzed for serum PSA, testosterone, prolactin, TSH, FSH and LH levels.

Inclusion Criteria:

- Patients with PCOS with hirsutism, obesity, irregular menstrual flow and/ infertility with USG showing polycystic ovaries
- 50 controls with normal ovaries on USG scan

Exclusion Criteria: women with Idiopathic hirsutism and androgen secretions, adrenal/ ovarian tumors, smokers, those on steroids, use of oral contraceptives.

An informed consent form was obtained from patients and healthy subjects early morning blood samples will be collected after overnight fasting in yellow capped containers (gel separators) from each subject in the early follicular phase (day 2 to 4 of menstrual cycle). The samples were analyzed within an hour of collection for the following analysis of serum PSA, Testosterone, TSH, Prolactin, FSH, and LH in Siemens analyzer by chemiluminescence immuno-assay technique(CLIA)

Statistical Analysis: The SPSS 22 software was used for statistical analysis. The data was expressed in the form of means and percentages. The Pearson correlation co-efficient was used to correlate the data from both groups

OBSERVATION AND RESULTS

A total of 100 patients divided into 2 groups of 50 each, In Group A 50 patients diagnosed with PCOS and in Group B 50 Healthy patients without PCOS were studied.

Table 1: Distribution Based On Age Group

Mean Age	Mean ± S.D
Group A	29.75 ± 3.29
Group B	30.68 ± 2.93
p-value	0.1047

The average age of Group A patients was 29.75 ± 3.29 years. while in the Group B it was 30.68 ± 2.93 years.

Table 2: Distribution Based On Various Serum Parameters

Mean Serum	Group A	Group B	p-value
PSA (ng/ml)	0.37 ± 0.17	0.02 ± 0.03	<0.0001
LH(IU/L)	18.23 ± 8.87	5.51 ± 2.95	<0.0001
FSH(IU/L)	33.46 ± 23.50	6.84 ± 2.94	<0.05
LH/FSH ratio	1.97 ± 1.102	0.93 ± 0.60	<0.0001
Testosterone (ng/ml)	1.854 ± 0.65	0.36 ± 0.18	<0.0001
PRL (ng/ml)	22.5±5.7	18.6±6.5	<0.0001

The mean Serum PSA levels in Group A was 0.37 ± 0.17 ng/ml. while in the Group B it was 0.02 ± 0.03 ng/ml, with p value <0.0001.

The mean serum LH levels in Group A patients was 18.23 ± 8.87 IU/L. while in the Group B it was 5.51 ± 2.95 IU/L, with p value <0.0001.

The mean serum FSH levels in Group A was 33.46 ± 23.50 IU/L. while in the Group B it was 6.84 ± 2.94 IU/L, With p value of <0.005.

The mean LH/FSH levels in Group A was 1.97 ± 1.102, while in the Group B it was 0.93 ± 0.60, with p value <0.0001

The mean serum Total Testosterone levels in Group A was 1.854 ± 0.65 ng/ml, while in the Group B it was 0.36 ± 0.18 ng/ml, with p value of <0.0001.

The mean serum Prolactin levels in Group A was 22.5±5.7 ng/ml, while in the Group B it was 18.6±6.5 ng/ml, with p value of <0.0001.

Table 3: Distribution Based On Pearson Correlation Coefficient

Pearson Correlation of PSA	Serum PSA in PCOS		Serum PSA in Controls	
	Pearson Correlation (r)	p-value	Pearson Correlation (r)	p-value
Age	-0.273	0.0335*	-0.1860	0.1545
LH	-0.1300	0.3215	-0.0501	0.7031
FSH	-0.05975	0.6500	-0.2010	0.1230
LH/FSH ratio	0.02310	0.8607	0.03443	0.7935
Testosterone	0.7860	<0.0001	-0.003072	0.9815
Ferriman-Gallwey score (FGS)	0.3655	0.0040**	-0.08433	0.5215

p < 0.05, **p< 0.01, ***p< 0.001,*p<0.0001**

PCOS group:
In the PCOS group, there was a slightly negative correlation with age, positive correlation between serum total testosterone and PCOS, and a moderately positive correlation with Ferriman - Gallwey score (FGS) for hirsutism.

There was no correlation between serum PSA and serum LH, PSH and LH/PSH ratio.

Control Group:
While in Control group, no correlation was found between serum PSA and age, LH, PSH, LH/PSH ratio, testosterone and FGS score.

DISCUSSION

PCOS is a prevalent endocrine disorder in females of reproductive age that affects between 6% to 8% of women worldwide.[7] It is attributed to increased risk of abnormal bleeding, dyslipidemia, type2 diabetes mellitus (T2DM), endometrial carcinoma, hypertension, infertility and presumably cardiovascular disease in females.[8]

Females with PCOS had higher serum PSA, FSH, LH, LH/FSH ratio levels, testosterone and Ferriman-Gallwey scores were considerably higher in PCOS patients. Positive correlations were observed between PSA with testosterone and FGS.

In females with PCOS, PSA is a potential marker of endogenous androgen excess.[9] PSA can be employed as a possible biochemical marker of hyperandrogenic conditions such as PCOS, adrenal hyperplasia, adrenal tumour, ovary and breast tumour attributable to the PSA and androgen correlation.[10]

Hirsutism is generally caused by an overabundance of androgens. It might be a sign of endocrine imbalance. We refer to hirsutism as male-pattern hirsutism, which is defined as excessive hair growth in areas where female subjects generally have far less than male subjects. The single most consistent endocrinologic observation in hirsutism is an increase in plasma free testosterone.[11]

PSA is detectable in female serum in relatively low levels, it can be measured using sensitive immunoassays.[12] and correlated with hyperandrogenic conditions, which might be a potential biochemical marker of androgen activity in females.

According to Bahceci M et al study. "There was positive correlation between PSA and FGS, and PSA was higher in females with PCOS and decreased with antiandrogen medication, implying that measuring PSA levels might be a marker for hirsutism".[13]

Based on the above data, Serum PSA levels were increased as a resultof endogenous androgen, As a corollary, it can be used as a diagnostic and biochemical marker of PCOS and other hyperandrogenic disorders. Furthermore, whether this may be a relevant marker for other hyperandrogenic disorders is undetermined and more studies are required to assess the sensitivity, specificity, and accuracy of this marker in other hyperandrogenic conditions such hyperplasia, adrenal, ovary, and breast tumors.

CONCLUSION

Serum PSA levels increased considerably in females with PCOS and were positively correlated with total testosterone and FGS score, but negatively correlated with age. As a result, serum PSA levels in females can be considered as a diagnostic and biochemical marker for PCOS and other hyperandrogenic disorders.

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