

STUDY ON CORRELATION BETWEEN PROSTATE SPECIFIC ANTIGEN (PSA) AND VARIOUS PROSTATIC PATHOLOGY

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ABSTRACT

Background: Prostate Specific Antigen (PSA) has been widely used in the diagnosis and management of patients with prostate cancer. It may be elevated in other prostatic diseases and surgical procedures. PSA exists in two forms, a major bound form (cPSA) and a free form (fPSA).

Aims & Objective: The objective of the study was to determine the relationship between serum PSA levels and histologic findings in biopsy specimens of men with prostatic disease in Surendranagar district of Gujarat and to correlate morphological types.

Materials and Methods: This study includes patients planned for transurethral resection of prostate (TURP). Blood samples were collected before TURP and tested for PSA. Histology of the tissue samples collected after TURP were studied and the relationship with PSA analysed using SPSS 12.0 Statistical software. The study pertains to utility of Prostate Specific Antigen Assay, in different Prostatic lesions e.g. Nodular Hyperplasia, Prostatitis and Carcinoma.

Results: 655 patients were studied for PSA levels and simultaneous histopathological study of the biopsy samples has been done. There were 534 (81.53%) cases of Nodular Hyperplasia of Prostate (NHP, clinically known as 'BPH'), 72 (10.99%) cases of Prostatic Intraepithelial Neoplasia (PIN), 45 (6.87%) cases of Adenocarcinoma of prostate. Serum PSA values were analyzed in different age groups (as 41- 50, 51-60, up to 91-100 years) and in different prostatic lesions like; NHP, PIN, Adenocarcinoma etc.

Conclusion: PSA is specific for the prostate but not for prostate cancer. PSA is raised in cancer, prostatic infection, urinary retention & Nodular Prostatic Hyperplasia. There is urgent need of a more reliable and precise serum marker that reflects prostate cancer (in the current PSA range of 4 to 10 ng/mL).

Key Words: Prostate Specific Antigen (PSA); Nodular Hyperplasia; Carcinoma; Prostatitis

Introduction

One of the most interesting aspect of the prostate is that both benign and malignant tumors are hormone (androgen) dependent, and so prostate has attracted the attention of medical professionals. Vast varieties of disorders of prostate are associated with significant morbidity and mortality in man.^[1,2] A 60-year-old man has a 23% chance of experiencing acute urinary retention (AUR) if he survives an additional 20 years. Nearly 1 in 10 men in their 70s will have AUR in the subsequent 5 years. As these disorders are common in elderly men; assessment and management of prostate is the important aspect in geriatrics practice and attracts research in gerontology.^[3-5]

PSA is a protein manufactured in the prostate and virtually no other organ. PSA is the enzyme responsible for liquefaction of semen within a few minutes after it has clotted.^[6,7] PSA levels in the blood go up if the barrier between the epithelium and the blood stream is damaged. The three typical sources for damage are: cancer, bacterial infection, and prostate infarction or destruction of part of the prostate by damage to its blood supply.^[7-9] Prostate specific antigen (PSA), a glycoprotein

serine protease, was first identified by Wang et al in 1979. It is a widely used serum marker first designed for the early detection and monitoring of patients with prostate cancer. However it is evident now that a raised PSA level can also occur in non-malignant conditions like benign prostatic hyperplasia (BPH), inflammation, diagnostic and surgical procedures. These conditions may mimic cancer and cause confusion in diagnosis. Especially in Prostatic carcinoma detection programme that use PSA as a screening test. Immunoreactive PSA (total PSA [tPSA]) exists in two forms, a major fraction is bound to serum proteins (cPSA) and about 10-30% is free (fPSA). There are reports on relationship between serum tPSA levels and histological findings on prostate biopsies. Free PSA measurements can be used to improve the specificity of PSA for Prostatic Carcinoma, especially when tPSA values are between 4.0 and 10.0 ng/ml.

Aims and Objectives: (i) To study prevalence of distribution of various prostatic lesions, in the region of Surendranagar District (Central area of Gujarat). (ii) To evaluate the utility of PSA assay as a method of investigation in diagnosis of prostatic lesions. (iii) To correlate morphological types with Serum PSA levels.

Materials and Methods

A prospective study carried out in patients who were referred to the Pathology department of C.U. Shah medical college and Hospital, Surendranagar, Gujarat, from Jan 2005 to Dec 2013 (i.e. 9 years).

Total 655 prostate biopsies were received, where serum PSA level of the patient was simultaneously determined. Clinical details like provisional diagnosis, age of the patients on presentation and mode of presentation etc. were recorded.

The tissue samples collected after TURP (Trans Urethral Resection of Prostate) were fixed in 10% formalin. The tissues were prepared routinely, embedded in paraffin, cut to a thickness of four microns and stained by Hematoxylin- Eosin and reported as following;

- Benign prostatic hyperplasia without and with inflammation, which includes chronic prostatitis, acute prostatitis, chronic active prostatitis.
- Prostatic intraepithelial neoplasia (PIN), which includes, Low-grade PIN (LGPIN) and High-grade PIN (HGPN).
- Prostatic adenocarcinoma.

The histopathological diagnosis was compared with PSA levels to determine the sensitivity and specificity of PSA assay. The PSA assay was carried out using the ARCHITECT for total PSA assay by Chemiluminescent microparticle immune assay.

Statistical analysis was done by SPSS 12.0 statistical software. Out of 655 Prostatic biopsy that we have received, we have got Serum PSA Value of 385 patients and co-relate it with findings of other studies.

Results

Most common lesions were Nodular Hyperplasia of Prostate (NHP, clinically known as BPH) followed by Adenocarcinoma and PIN.

Table-1: Distribution of different types of lesions

Lesion	No. of Patients	%
BPH	534	81.53
Adenocarcinoma	45	6.87
P.I.N.	72	10.99
TB Prostatitis	02	0.30
Transitional cell carcinoma	01	0.15
Transitional cell Papilloma	01	0.15
Total	655	100

Table-2: Distribution of Different Lesions according to PSA level

PSA Range (ng/ml)	Total N (%)	Carcinoma N (%)	P.I.N. (%)	B.P.H. (%)
0-4	224 (58.18)	00	12 (26.08)	212 (67.51)
4-10	108 (28.05)	2 (8)	14 (30.43)	92 (29.29)
>10	53 (13.76)	23 (92)	20 (43.47)	10 (3.18)

Discussion

PSA is produced exclusively by the epithelial cells lining the prostatic acini and ducts of prostatic tissue. Because of its high specificity for prostate tissue, PSA is the preferred serum marker for Prostatic carcinoma. Unfortunately, PSA is specific for prostate tissue but not for prostate cancer. It is also found in abnormal concentrations in normal and benign changes of the prostate such as BPH and other non-neoplastic prostatic lesions. The usefulness of PSA as an early detector of prostate cancer by itself is questionable, owing to the overlap in PSA values seen in patients with BPH and in those with organ-confined Prostate cancer.

Table-3: Comparison of benign & malignant proliferative lesions with other studies

Lesion	Present Study	Jean et al ^[10]	Arum Chital ^[11]	Janardan et al ^[11]
NPH	81.53%	83%	89%	93.90%
Adeno Ca	06.87%	17%	11%	06.06%

Apart from prostatic volume, other factors contributing to increase in PSA in men is age, episodes of subclinical or clinical prostatitis, intermittent bouts of prostatic ischemia, infarction and the presence of prostate cancer that cannot be detected by currently available methods.^[7] Furthermore, as men grow older, their prostate glands may become more "leaky". The normal physiological barriers that keep PSA in the prostate duct system may become more permeable and allow serum PSA to enter the general circulation via the capillaries and lymphatics.

Conclusion

PSA is specific for the prostate but not for prostate cancer. PSA is raised in cancer, prostatic infection, urinary retention & Nodular Prostatic Hyperplasia. There is urgent need of a more reliable and precise serum marker that reflects prostate cancer (in the current PSA range of 4 to 10 ng/mL).

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