Research Paper

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ROLE OF PSA IN PROSTATIC DISEASES

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ABSTRACT

Introduction : Prostatic specific antigen (PSA) has achieved a wide spread clinical use as a tumour marker in the field of prostatic pathology. In the present study PSA was determined in patients of benign prostate hypertrophy (BPH) and Carcinoma Prostate (Ca-P) to evaluate its diagnostic efficiency in day to day management of prostate cancer patients.

Maerial and methods : This observational study was carried out in RIMS, Ranchi, Department of General surgery over a period of 1 year. 40 patients admitted through outdoor, emergency presenting with features of Lower Urinary Tract Symptoms (LUTS) were included in the study.

Result : 90.9% of the patients with PSA value >10ng/ml have Ca-P with specificity and positive predictive value of PSA at >10ng/ml being 83.3% and 86.9% respectively.

Conclusion : Though PSA is not a specific investigation for diagnosis of Ca-P but higher values of PSA is more likely due Ca-P. Positive test does not mean to have prostate cancer nor does a negative test always confirms the absence of cancer.

KEYWORD

prostate specific antigen, benign prostatic hypertrophy, carcinoma prostate

ARTICLE HISTORY

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INTRODUCTION:

Prostate specific antigen (PSA) is a 33 kDa protein consisting of a single-chain glycoprotein first identified in seminal plasma in 1971 by Hara et al.(1) and subsequently isolated from prostatic tissue in 1979 by Wang et al. (2). It belongs to the group of serine proteases. It is produced by prostate secretory epithelium and vesiculae seminales (3). In the serum of healthy men in physiological conditions there is a very low concentration of PSA of prostate origin. PSA in serum is present only in case of disrupted microarchitecture of prostate gland tissue, which becomes the cause of PSA crossing into the surrounding extracellular space, where is being swept away by lymph in the systemic circulation and is always an indication of trauma or prostate disease.

In serum, normal range is from 0.1 to 4 ng/mL. PSA test allows doctors to detect prostate cancer, while they are still small, low grade and localized. PSA is a prostate-specific, but not specific to prostate cancer, and is also increased in other diseases of the prostate.

Pathological conditions causing increased serum PSA levels :

- BPH
- Carcinoma prostate -often elevated PSA but not always
- Bacterial prostatitis – may elevate PSA levels but they generally return to baseline 6 to 8 weeks after symptoms resolve.
- Prostate biopsy – median elevation 7.9 ng/mL.
- Transurethral resection of the prostate – can elevate PSA levels by a median of 5.9ng/mL.
- Acute retention of urine

Physiological conditions causing increased serum PSA levels :

- Digital Rectal Examination (DRE) – has minimal effect on PSA level & increase by up to 0.2 to 0.4 ng/mL
- Ejaculation can increase PSA levels by up to 0.8 ng/mL, though levels return to normal within 48 hours.

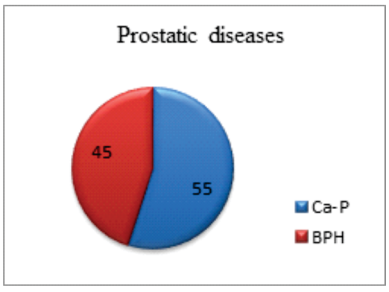
5-alpha reductase inhibitors like Finasteride and dutasteride **lower** PSA levels. Finasteride lowers PSA by a median 50% within six months of use. Prostatic intraepithelial neoplasia (PIN) does not raise serum concentration of PSA (4).

The aim of this study was to determine the specificity, sensitivity, positive predictive value of the total value of PSA in the diagnosis of prostate cancer, and justifiability of using the same in cancer detection. The aim was also to determine the significance of PSA in diagnosis of benign prostate hyperplasia, precancerous conditions and inflammatory and atrophic changes of the prostate.

MATERIALS AND METHODS

The present work comprises observations on 40 patients above 50 years of age presenting with features of lower

urinary tract symptoms admitted in department of General Surgery, RIMS. These cases formed the material of study. Results are shown through number of cases, percentage, sensitivity and specificity.



OBSERVATIONS AND RESULTS :

In our study 40 cases presenting with features of LUTS were studied, out of which 22 cases(55%) were diagnosed with Ca-P and 18 cases (45%) diagnosed with BPH (Table 1)

In cases of Ca-P patients (n=22) PSA was found to be significantly higher

Bar chart showing total cases of BPH and Ca-P

Table 1. Serum PSA level in Ca-P and BPH

Serum PSA level(ng/ml)	Ca-P cases	BPH cases
<4	Nil	10
4 – 10	2	5
>10	20	3
Total	22	18

The sensitivity, specificity and positive predictive value of PSA with cut off level of 4 ng/ml and 10 ng/ml were found to be 100%, 50%, 70.9% and 90.9%, 77.8% and 83.4% respectively (Table 2).

Table 2. Sensitivity, Specificity, Positive predictive value of PSA

	Cut off level 4ng/ml		Cut off level 10ng/ml	
	<4.0 ng/ml	>4.0ng/ml	<10ng/ml	>10ng/ml
Ca-P	Nil (FN)	22 (TP)	2 (FN)	22 (TP)
BPH	10(TN)	8(FP)	15 (TP)	3 (FP)
Sensitivity	100 %		90.9 %	
Specificity	55.6 %		83.3 %	
PPV	73.3 %		86.9 %	

FN – False negative, TP- True positive, TN – true negative, FP – False positive PPV – Positive predictive value

DISCUSSION -

The early diagnosis and management of BPH and Ca-P could be achieved in the first phase by the combined use of serum PSA determination, digital rectal examination and in the second phase prostate imaging by transrectal ultrasound of prostate gland and ultrasound guided biopsy of prostate in select cases. The diagnostic efficiency of any tumor marker is judged by its specificity and sensitivity. However, the overlapping values of serum PSA falling especially in gray zone i.e., between 4-10 ng/ml offer great difficulty in differentiating early Ca-P from BPH.

The sensitivity, specificity and positive predictive value of PSA with cut off level of 4 ng/ml and 10 ng/ml were found to be 100%, 50%, 70.9% and 90.9%, 77.8% and 83.4% respectively (Table 2). Thus it was found in our study, that serum PSA levels of 10 ng/ml and above were good indicator to detect carcinoma of prostate with a high level of positive predictive value. However, with low cut off point, sensitivity was increased but predictive value and specificity suffered, thereby getting a large number of false positive cases.

PSA in BPH is generally < 4.0 ng/ml and in our study 10 out of 18 (55.6%) cases had levels less than 4 ng/ml. A total of 5 patients (27.8%) had a serum PSA levels between 4 and 10 ng/ml, and 3 patients (16.6%) had a serum PSA of greater than 10 ng/ml.

Ereole et al 1980 [5], had 18% and 3% of BPH cases with serum PSA levels of 4-10 ng/ml and >10ng/ml respectively. In another study [6] it was 43% and 10% of BPH cases in the same range, where as Annitage et al [7] had 35% and 12% cases in the same range of PSA. In our series the figures comparatively match with those found in other international studies.

In the study conducted by Stamey et al 1987 [8], the mean PSA levels in cases of carcinoma patients has been detected to be 5-16 times higher than the normal BPH levels. In our study, the PSA levels, were also found to be very high in few cases and reaching >100 ng/ml in few cases. However in most of the cases, the levels were in the range of 10-70 ng/ml.

CONCLUSION :

Though PSA is not a specific investigation for diagnosis of Ca-P but higher values of PSA is more likely due Ca-P. PSA test is very important tool used to screen for early signs of prostate cancer along with DRE. The specificity of PSA level for prostate cancer is trying to be improved by additional tests such as ratio of free to total PSA, PSA density, PSA density of transitional zone etc. Diagnosis of prostate cancer is made by the combined results of clinical signs, DRE and PSA values and diagnosis is confirmed by biopsy. PSA levels are also of much help in the post-operative follow-up of prostate cases more so in malignant conditions.

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