

Original Article



Prostatic Lesion and Its Relation with Serum Concentration of PSA

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Abstract

Background: Prostate-specific antigen (PSA) is a protein produced by the cells of the prostate gland. It is generally increased in diseases such as prostatitis, hyperplasia and malignancy, but the correlation between various pathology affecting the prostate gland and their corresponding rise in PSA values is not constant, and exception may occur. **Objectives:** The aim of this study was to find out the spectrum and distribution of various prostatic lesions affecting men, with respect to their age and to find out the correlation between serum total PSA and histological findings. **Materials and Method:** From January 2016 to March 2019, a total of 166 patients in the age group of 39-95 years who underwent histopathology. The reports were studied retrospective and prospectively. Of these patients, 63 were being nodular hyperplasia of prostate. 70 were with existing prostatitis and 33 were adenocarcinoma. The PSA levels were estimated in our Biochemistry Department. **Results:** The cases were distributed in the age group 39 to 95 years. The patient of adenocarcinoma was 33 and its mean value of PSA was 1164.19 ng/ml, in case of prostatitis number of patient was 70 and its mean value was 12.74ng/ml, prostatic hyperplasia patient was 63 and mean value was 5.2ng/ml. **Conclusion:** The result indicate that the chances of malignancy with increasing value of PSA are more but not a rule. It can only give a clue to the histopathologist to examine the sections more thoroughly.

Keywords: Prostate Specific Antigen, Adenocarcinoma, Prostatitis.

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Introduction

Disease primarily inflicting prostate gland are inflammation, benign nodular enlargement, and tumors. Worldwide benign prostatic hyperplasia (BPH) affects 210 million males and is common over the age of 50 years.^{1,2} Carcinoma of the prostate is the most common non skin cancer in the west and the second leading cause of cancer death among men.^{2,3} Prostate-specific antigen is a protein produced by cells of the prostate gland. It is generally increased in disease such as prostatitis, hyperplasia, and malignancy, but the correlation between various lesion affecting the prostate gland and their corresponding rise in PSA values is not constant, and exception may occur.

Early diagnosis of the disease is very essential so that potential number of patients can be assessed. Thus clinical evaluation including digital rectal examination (DRE), ultrasound

examination and finally histopathological checkup are the common modalities to come into reasonable conclusion about the prostatic lesion. However, there are chances that a final diagnosis may not be achieved due to initial stage of the disease or due to concealment of malignancy by superadded inflammation. PSA has achieved a wide spread clinical use as a tumor marker in the field of prostatic pathology. It is an organ specific marker and is being used as a serological and immune-histochemical marker. Most of the studies on assaying of PSA have been conducted abroad where the immunological state of the patient, his genetic character, dietary and exercise habits are different.^{4,5} Very little data regarding genetic and socioeconomic status is available in Bangladesh. Keeping these points in mind a retrospective study was carried out in 2016-2019 at Khawja Yunus Ali Medical College Hospital Laboratory, Enayetpur, Sirajganj to evaluate the relationship of PSA in different prostatic pathological situation

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Materials and Methods

From January 2016 to March 2019, a total of 166 patients in the age group of 39-95 yrs who underwent histopathological report were studied retrospective and prospectively. Of these patients, 63 were being nodular hyperplasia of prostate. 70 were with existing prostatitis and 33 were adenocarcinoma. This data was collected from the histopathology register book. All the patients underwent digital rectal examination and serum PSA measurement.

For PSA estimation five ml of blood was collected aseptically and serum was separated, liquated and frozen at -20°C for further PSA estimation. A sample is added to a reaction vessel with mouse monoclonal anti-PSA alkaline phosphatase conjugate, and paramagnetic particles coated with a second mouse monoclonal anti-PSA antibody. The PSA in the sample binds to the immobilized monoclonal anti-PSA on the solid phase while at the same time, the monoclonal anti-PSA alkaline phosphatase conjugate reacts with a different antigenic site on the sample PSA. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field while un bound materials are washed away. Then the chemiluminescent substrate Lumi-Phase*530 is added to the vessel and light generated by the reaction is measured with a luminometer. The light production is directly proportional to the concentration of PSA in the sample. The amount of analytic in the sample is determined from a stored, multi-point calibration curve.

Results

A total number of 166 cases were studied. The cases were distributed in the age group 39 to 95years. In case of carcinoma prostate 33 cases (Table I) were found with PSA range from 13.9 to 8523 ng/ml (Table II) and age limitation was 50 to 95 years. 70 cases (Table I) of prostatitis were found with PSA range (0.55 to 99.90ng/ml) and age limitation 50 to 88 years. In case of nodular hyperplasia of prostate 63 cases (Table I) were found with PSA range 0.15 to 24.50 ng/ml (Table II) and age limitation was 39 to 90 years.

Table I: Serum PSA levels in carcinoma prostate, BPH and prostatitis cases

Serum PSA level (ng/ml)	Carcinoma	BPH	Prostatitis
	(No. of pts)	(No. of pts)	(No. of pts)
<4	Nil	31	17
4.1-10	Nil	25	32
10.1-20	4	5	8
20.1-50	3	2	10
> 50	26	—	3
Total	33	63	70

Total number of patient 166.
 Carcinoma prostate - 33, Prostatitis - 70, Prostatic hyperplasia - 63,
 Ca prostate=19.87%, Mean PSA of Ca prostate is 1165.71ng/ml.

Prostatitis =42.16%, mean PSA of prostatitis is 12.75ng/ml.
 Prostatic hyperplasia = 37.95%, mean PSA of NPH is 5.2ng/ml. (Figure-1)

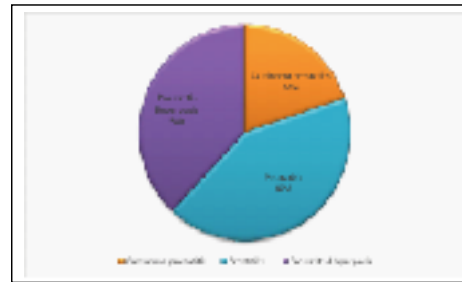


Figure 1: Pie diagram of Prostatic Pathology.

Table II: Serum PSA level maximum, minimum, mean and SD for Adenocarcinoma, Prostatitis and Hyperplasia

Disease	Maximum	Minimum	Mean	SD
Adenocarcinoma	8523.00	13.90	1165.71	2003.89
Prostatitis	99.90	0.55	12.75	16.34
Hyperplasia	24.50	0.15	5.20	4.57

Table II Serum PSA level in Adenocarcinoma maximum value 8523.00 ng/ml, minimum value 13.90ng/ml, mean value 1165.71 and SD 2003.89, In Prostatitis maximum value 99.90ng/ml, minimum value 0.55ng/ml, mean value 12.75 and SD16.34. In Nodular Hyperplasia maximum value 24.50 ng/ml, minimum value 0.15, mean value 5.20 and SD 4.57.

Discussion

PSA was first identified in seminal plasma by Hara et al⁶ in Japan in 1971 and was termed as gamma seminoprotein and in 1973⁷, the protein was isolated and purified. In 1979 Wang et al⁸ isolated a tissue specific antigen from prostate and termed it as PSA, which was later found to be immunologically identical to that originally found in seminal plasma. In 1980, a serological test to measure PSA in human serum was developed.⁹

It is a single chain glycoprotein of 240 aminoacid residue and a 4 carbohydrate side chain. It is homologous with protease of the kallikrein family, and has 34 KD molecular wt. It is organ specific produced only by prostate epithelial cells and results in liquification of the seminal coagulum. Half life of PSA is found to be 2.2 ± 0.8 days and because of this long half life, a minimum of 3-4 weeks is required for the serum PSA concentration to reach its nadir after prostate biopsy or surgery on prostate.¹⁰ There is no diurnal variation of serum PSA and this marker remains stable in frozen serum for a long period.¹¹

PSA concentration can be affected by any type of prostatic manipulation which includes per rectal examination, prostate biopsy, prostatectomy and prostatitis. Prostate biopsy results in significant elevation of PSA and levels do not reach a base line till the end of 4 weeks. So PSA estimaton should not be done within one month of prostatic biopsy. Other factors which may increase serum PSA level includes strenuous exercise,acute retention of urine and prostatic ischemia.¹¹

In our preliminary study, serum PSA levels in 33 cases of carcinoma prostate ranged from 13.9 to 8523ng/ml with mean 1165.71ng/ml. (Table II) In case of BPH PSA level ranged from 15 to 24.50 ng/ml (Table II) mean 5.2 ng/ml while in case of prostatitis, PSA ranged from 1.56 to 99.90 ng/ml (Table II) mean 12.74ng/ml.

Sensitivity of PSA estimation is 100%, specificity 63.9%, positive predictive value 27.96% and negative predictive value 100% where cut of value was 4ng/ml.

In the study conducted by Stamey et al.¹²1987, the mean PSA levels in case of carcinoma patients has been detected to be 5-16 times higher than the normal BPH level. In our study, the mean PSA of carcinoma is 223 times higher than the normal BPH which is far difference.

The mean age of diagnosis of prostatic carcinoma in the present study was 64.78 years. The largest percentage of cancer patients were found to be clustered in the age group of 60 to 75 years. This correlated with the study conducted by Ghafoori M et al¹³ and Catalona WJ et al.¹⁴ In the study done by Qulan et al, mean age for carcinoma was 64.4 years (44 to 77 years).¹⁵ According to study done by Di Silverio F et al, mean age for prostatic carcinoma was 68.9 years.¹⁶ In a study done by Kyungeun et al, mean age was 64.4 years (42 to 78 years) in 148 cases.¹⁷ Our finding was similar to the above studies.

Conclusion

Serum PSA is elevated marginally in patient with NPH without inflammation and patient with chronic inflammation. The cut-off value is 4ng/ml. Screening of prostatic lesions with serum PSA level is sensitive but not specific. The present study concluded that among NPH, carcinoma prostate and prostatitis, the prostatitis was the commonest lesion of prostate.

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