Section: Urology

Original Research Article

SERUM PSA CORRELATION WITH VARIOUS HISTOPATHOLOGY OF PROSTATIC LESIONS WITH SPECIAL REFERENCE TO MALIGNANT PATHOLOGY

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ABSTRACT

Background: Prostate cancer is now a leading cause of cancer death among adult males, but it can be completely cured if detected in early stage. Prostate Specific Antigen (PSA) level estimation has become a popular method for screening prostatic carcinoma as it is easy to perform and is cost effective.
Aim: To evaluate various histopathological types of Prostatic lesions and to correlate these with serum prostate specific antigen levels.
Material & Methods: The present study is a prospective study of 1.5 year period done from 1st July 2022 to Dec 2023 in the Department of Urology, National institute of medical science and research (NIMS Hospital), Jaipur. Prostatic tissues of 120 patients were collected through transurethral resection (TURP), trans rectal biopsy and open prostatectomy for histopathological examination. Serum samples for biochemical analysis (S.PSA) were collected and estimated in biochemistry department. Then values of serum PSA were correlated with histopathological diagnosis. The cut off value of serum PSA was set at 4ng/ml.
Results: Out of total 120 patients 89 (74.1%) have benign disease, 25(20.8%) had malignant disease and 6(5%) had Prostatic intraepithelial neoplasia. 60.8% of patients had raised PSA above 4ng/ml. 96% of malignant cases had serum PSA >4ng/ml and only 4% of malignancy had PSA within 4ng/ml. Out of total malignancy 96% were adenocarcinoma. The sensitivity and specificity of serum PSA in detecting malignancy were 93.5% and 50.5% respectively.
Conclusions: Serum prostate specific antigen is highly sensitive but less specific in diagnosing prostate cancer. Due to its high sensitivity and low cost it can be reliably used as a screening test for early detection of prostate cancer.
Keywords: Adenocarcinoma prostate, Benign prostatic hyperplasia, Prostatitis, Serum prostate specific antigens.

INTRODUCTION

Prostatic carcinoma is an important growing health problem, presenting a challenge to urologists, radiologists and pathologist.[1,2] The incidence of prostatic diseases, benign prostatic hyperplasia, and carcinoma increases with age.[3] Prostate cancer is the most common malignant tumor in men over the age of 65 years. In India average annual cancer incidence rates for prostate ranged from 5.0 to 9.1 per 100,000/year.[4] Prostatic diseases are usually present as lower urinary tract symptom. Histological, the prostate gland consists of compound tubulo alveolar glands lined by double layer of cells, a basal layer of low cuboidal epithelium along with scattered neuroendocrine cells covered by columnar secretory cells. The glandular epithelium secrets prostate specific antigen. Stroma has large content of smooth muscle fibers. Most frequently encountered diseases of prostate are benign prostatic hyperplasia, prostatitis, and prostatic carcinoma.[5] Of these, benign prostatic enlargements are the most common. Clinically prostatitis can be classified into three broad categories including acute, chronic, and granulomatous prostatitis. The most likely precursor lesions of prostate cancer namely prostatic intraepithelial neoplasia (PIN) and atypical adenomatous hyperplasia (AAH) are being

recognized with high frequency and progresses to frank malignancy in about 50% and 6.5% of patients respectively.[6]

Prostate-specific antigen (PSA) is the most useful tumor marker in diagnosis and first line test in screening.[7] The increase in serum PSA depends on differentiation of tumor cells. Gleason grading is one of the most powerful predictors of biological behaviour and influential factors used in determining treatment. PSA, when combined with Gleason score and clinical stage, improves the prediction of pathological stage for prostate carcinoma.[8] PSA, a glycoprotein is produced by the epithelial cells of prostatic tissue with normal levels of 0-4ng/ml.[9] Increased PSA levels are seen in all prostatic diseases like benign prostatic hyperplasia, prostatitis, prostatic trauma, and prostatic infarction; but markedly elevated levels are indicative of carcinoma prostate. It is considered as most effective test currently available for detection of carcinoma prostate and predicting tumor recurrence months before its detection by any other method. This study is conducted to correlate PSA levels in different prostatic pathology.

MATERIALS AND METHODS

The present study is a prospective study of 1.5 year period done from 1st July 2022 to Dec 2023 in the Department of Urology, National institute of medical science and research (NIMS Hospital), Jaipur.

Prostatic tissues of 120 patients were collected through transurethral resection (TURP), trans rectal biopsy and open prostatectomy for histopathological examination.

Serum samples for biochemical analysis (S.PSA) were collected and estimated in biochemistry department using automated Chemiluminescence method on Beckman Coulter Access –II System.

After clinical examination, blood examination and radiographic examination samples of prostatic tissue were obtained and immediately fixed in 10% buffered formalin followed by grossing, processing and staining of tissue. Routine staining was done by haematoxylin and eosin staining. Special stain used where ever necessary.

Serum prostate specific antigen cut off point was fixed at 4ng/ml .Sensitivity and Specificity were calculated regarding the diagnostic efficacy of biochemical marker for malignancy.

All the prostate biopsy specimens collected through transurethral resection (TURP), trans rectal biopsy and open prostatectomy in the Department of Urology, Nims hospital , Jaipur were included in the study. Inadequate biopsy material, follow-up cases, post therapeutic and recurrent tumours were excluded from the study.

RESULTS

Total 120 number of cases were studied. The cases were distributed in the age group of 40 to 90 years. The maximum number of patients were in the age group of 60-69 years consisting of 42 cases. Least number of cases are in between 40-45years of age. Most of the malignant prostatic lesions were in the age group between 70-79 years. The mean age of the patients was 67.9.

Out of total 120 patients, 88.3% of patients presented with lower urinary tract symptoms, 7.5% of patients had lower urinary tract symptoms with hematuria and only 4.1% of patients had isolated hematuria.

Out of a total of 120 patients, benign prostatic disease constituted 74.1% cases, followed by malignancy in 20.8% and prostatic intraepithelial neoplasm in only 5% cases.

Out of 120 cases, there were 78 (65%) cases constituted Benign prostatic hyperplasia without any inflammation, 11(9.1%patients) had BPH with inflammation, 6(5%) patients had prostatic intraepithelial neoplasia. Prostatic adenocarcinoma was the major type of malignancy which constituted 20% of cases. The urothelial carcinoma , another least common type of prostatic malignancy , which constituted 0.9% of cases.

Of total 89 benign cases 76 (85.3%) cases had normal digital rectal examination(DRE). Most of the PIN cases (66.6%) had also normal DRE. But majority of prostatic carcinoma patients (84%) had abnormal digital rectal examination having hard and/or nodular prostate. [Table 1]

Raised serum PSA (Cut off value 4ng/ml) were found in 60.8% of patients, of which 46.5% cases had serum PSA above 20ng/ml. Level of serum PSA between 10-20ng/ml and 4-10ng/ml were found in 12.3% and 53.4% of cases respectively. Out of total 25 malignant cases, 24 cases had PSA level above 4ng/ml and only 1 case had PSA below 4ng/ml. Out of total 6 cases of PIN, 5cases had PSA above 4ng/ml. Again out of 89 benign cases, 44 cases had PSA above 4ng/ml.

In this study the sensitivity of S.PSA in detecting prostatic malignancy was 93.5% and specificity was 50.5%. [Table 3]

Table 1: Distribution of prostatic disease according to age

Age range in yrs	Total no. of patients	Benign disease		PIN		Malignant disease	
		No. of patients	%age	No. of patients	%age	No. of patients	%age
40-50yrs	04	04	4.4	00	00	00	00
50-60yrs	26	23	25.9	01	16.7	02	8.0
60-69yrs	42	31	34.9	04	66.6	07	28.0
70-79yrs	36	24	26.9	01	16.7	11	44.0

80-89yrs	12	07	7.9	00	00	05	20
Total	120	89	100	06	100	25	100

Table 2: Spectrum of prostatic Diseases

HP diagnosis	Number of patients	%age
Benign prostatic hyperplasia(BPH)	78	65.0
BPH with prostatitis	11	9.1
Prostatic intraepithelial Neoplasia(PIN)	06	5.0
Adenocarcinoma	24	20.0
Urothelial carcinoma	01	0.9
Total	120	100

Table 3: Serum PSA correlation with prostatic pathology

S. PSA (ng/ml)	Total no. of patients	Benign disease		Prostatic intraepithelial Neoplasia		Malignant disease	
		No. of patients	%age	No. of patients	%age	No. of patients	%age
Up to 4	47	45	50.6	01	16.6	01	4.0
4-10	39	36	40.4	00	00	03	12.0
10-20	09	05	5.7	02	33.4	02	8.0
>20	25	03	3.3	03	50.0	19	76.0
Total	120	89	100	06	100	25	100

Table 4: Probability of S. PSA in determining malignancy

Sensitivity	93.5%
Specificity	50.5%
PPV(Positive predictive value)	39.7%
NPV(Negative predictive value)	95.7%

DISCUSSION

Carcinoma of prostate is common urological cancer that is diagnosed with DRE, PSA level, and prostate biopsy. In the present study, 95.8% of the patients complaint of lower urinary tract symptoms with or without hematuria. Raza et al,[10] in 2015 did a similar study in which the lower urinary tract symptom was the most common presenting symptom.

Maximum number of cases (42) were in the age group of 60-69 years. This is compared with the study conducted by Wei et al,[11] In this study the mean age of the patients was 67.9. The peak age incidence of malignancy in our study was in 7th and 8th decades with a mean of 70.9 years similar to the study by Jasani et al (2012),[12] and Albashari et al (2014).[13]

Benign prostatic hyperplasia with or without prostatitis constitute major histopathological type of prostate carcinoma constituting 74.1% of patients. Carcinoma prostate constituted second commonest group next to benign prostatic hyperplasia constituting 20.9% of total cases. Out of total malignant cases adenocarcinoma was the most common histological type found in our study constituting 96% of the total malignancy and this observation was similar to study done by Jishani et al in 2012 where the relative percentage of adenocarcinoma constituted 96.7% of total prostatic malignancy.

In this study, Serum prostate specific antigen level was measured in every patients and the levels were found to be increased (cut off of 4ng/ml) in 60.8% of cases. Among patients with increased serum PSA levels, 34.2% had PSA >20ng/ml. A similar observation was reported by Wadgaonkar et al,[14] in 2013 who studied 80 cases in 2 years and found to have increased level of serum PSA (with a cut off of 4ng/ml) in 66.25% of cases.

In our study, 96% of malignant cases had serum PSA >4ng/ml and only 4% of malignancy had PSA within 4ng/ml. In a study done by Zivkovic S et al (2004),[15] 97.5% of prostatic malignancy had serum prostate specific antigen level above 4ng/ml which is comparable to our study.

Comparing sensitivity and specificity of serum prostate specific antigens in diagnosis of prostatic malignancy, we found that serum PSA is 93.5% sensitive and 50.5% specific in detection of malignancy. The sensitivity and specificity of serum PSA in a study done by Shiek M et al,[16] was 93.4% and 59% respectively which is comparable to our study. The following table 5 showing sensitivity and specificity of various studies.

Table 5: Comparison of sensitivity and specificity of PSA in detecting malignancy

Study	Present study	Shiek M et al[16]	Lakhey. M et al[17]	Shalini Agnihotri et al[18]
Sensitivity	93.5%	93.4%	100%	79%
Specificity	50.5%	59%	49%	59%

CONCLUSION

Serum prostate specific antigen is highly sensitive in diagnosis of prostate cancer. But it has low specificity, because it also increases in other conditions like after DRE, Prostatitis, after acute urinary retention and also after ejaculation. Still due to its high sensitivity and low cost it can be reliably used as a screening test for early detection of prostate cancer. Again advanced PSA testing like PSA density, PSA velocity, Free and complex PSA can be used for more specific detection of prostate cancer.

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