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Correlation of serum PSA level with histopathological findings of prostate specimens in tertiary care hospital

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Abstract

Introduction: Prostate cancer is the most common malignancy in men over 65 years of age. PSA is a glycoprotein produced by epithelial cells of prostatic tissue with normal levels of 0-4ng/ml. Increased PSA levels are seen in all prostatic diseases but markedly elevated levels are seen in carcinoma prostate.

Aims and objectives

- To establish the correlation of histopathological findings with serum prostate specific antigen levels.
- To evaluate the histopathological spectrum of non- neoplastic and neoplastic lesions of prostate in correlation of serum PSA level.

Methodology: Retrospective study of 120 patients was done in department of pathology, civil hospital, Ahmedabad from 1/10/23 to 30/6/24. Unwilling, inadequate biopsies, metastatic carcinoma and severely morbid patients were excluded.

Results: Benign prostatic hyperplasia was the most common lesion with 44.1% followed by carcinoma with 35%. Serum prostate specific antigen level was increased in 76.7% cases.

Conclusion: The serum prostate specific antigen levels are a good indicator for the glandular proliferation of prostate. It is a highly sensitive tumor marker with a low specificity as many benign conditions also increase its level. Serum PSA is an early marker for prostate cancer but a more specific test is needed for screening.

Keywords: PSA, Prostatitis, prostatic intraepithelial neoplasia (PIN), Adenocarcinoma of prostate, Benign Prostatic Hyperplasia (BPH)

Introduction

Prostate cancer is the leading cause of death in men and is second only to lung cancer. Several factors including age, race, family history, hormone levels, and environmental influences are suspected to play a role in pathogenesis. Benign prostatic hyperplasia, prostatic carcinoma and prostatitis are three major pathological processes which frequently affect the prostate gland. It is extremely common in elderly male over the age of 50 years. Serum PSA levels are widely used biochemical marker for diagnosis and management of prostate diseases in developing country like India but it is controversial.

PSA is a product of prostatic epithelium and it is normally secreted in semen. It is an androgen-regulated serine protease. Its function is to cleave and liquefy the seminal coagulum formed after ejaculation. Normal PSA level is <4 ng/ml, but they vary according to the age of patient. PSA is elevated by any change that disrupts the normal architecture of prostate which allows diffusion of protease into the microvascular circulation.

The primary reason for the utilization of serum PSA as screening test should be that the procedure detects the early stages of a prostate pathology and allows for early intervention, thereby preventing unnecessary morbidity or mortality before any clinical signs or symptoms of the disease. Serum PSA, is a very sensitive but relatively non-specific. Serum PSA level test is rapid, inexpensive and is minimally invasive.

Aims and Objectives

- To evaluate the diagnosis of different prostatic diseases through serum PSA level correlation with histopathological examination.
- To evaluate age wise prostate diseases distribution and its correlation with serum PSA level.
- To motivate patients and doctors to adopt the serum PSA as screening test which can be used as diagnostic biochemical marker and less costly to patient.

Materials and Methods

This is tertiary care hospital based retrospective study was carried out in department of pathology, B.J Medical collage, civil hospital, Ahmedabad. The duration of the study was from 1/10/23 to 30/6/24. During this period total 120 cases of prostate specimen and their serum PSA level were evaluated.

During this study, unwilling, inadequate biopsy, metastatic carcinoma and severely morbid patients were excluded. Cases with only tissue biopsy or with only PSA levels were also excluded.

Out of total 120 cases, 102 cases were from trans-urethral resection (TURP) specimen, 7 cases of needle biopsies, 4 cases of trans-urethral resection with de-roofing and 7 cases of total prostatectomy. Relevant clinical and radiological investigations were collected from patients’ case files. Serum samples for biochemical analysis (S.PSA) were collected and estimated in biochemistry department using automated chemiluminescence method.

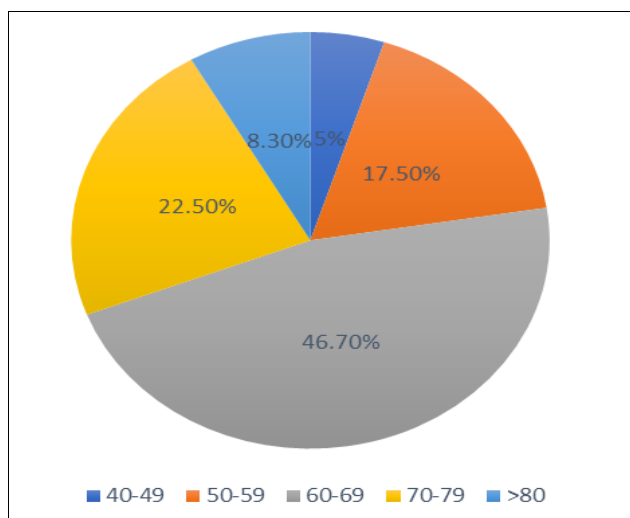
The received prostatic tissue and specimens were immediately fixed in 10% buffered formalin followed by grossing, processed by paraffin blocks, staining of tissue was done, then reviewed by pathologists. Routine staining was done by hematoxyline and eosin staining. Special stains were used where ever necessary.

Results

In this study, total 120 histopathology specimens of prostate tissue were assessed.

1. Age wise distribution of patients

Age (years)	No of patient	% of patient
40-49	6	5
50-59	21	17.5
60-69	56	46.7
70-79	27	22.5
>80	10	8.3
TOTAL	120	100

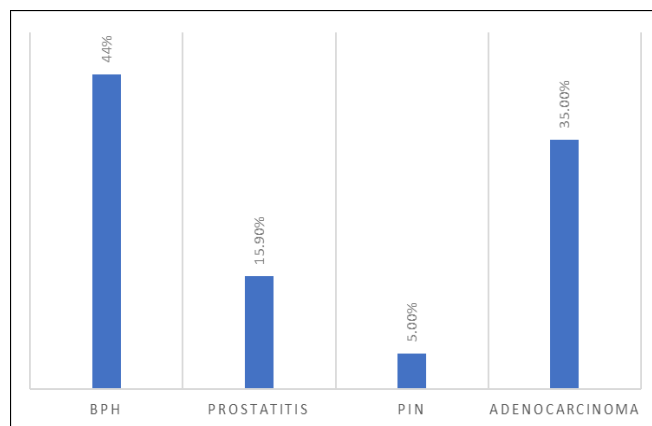


Observation

The above graph & table represent that 46.7% of patients in our study belong to the age group of 60-69, followed by 22.5% in the age group 70-79%, 17.5% patients in 50-59 years of age, 8.3% in more than 80 years of age & only 5% between 40-49 years of age group.

2. Frequency distribution of diagnosis

Disease	No of patient	% of patient
BPH	53	44.1
Prostatitis	19	15.9
Pin	6	5
Adenocarcinoma	42	35

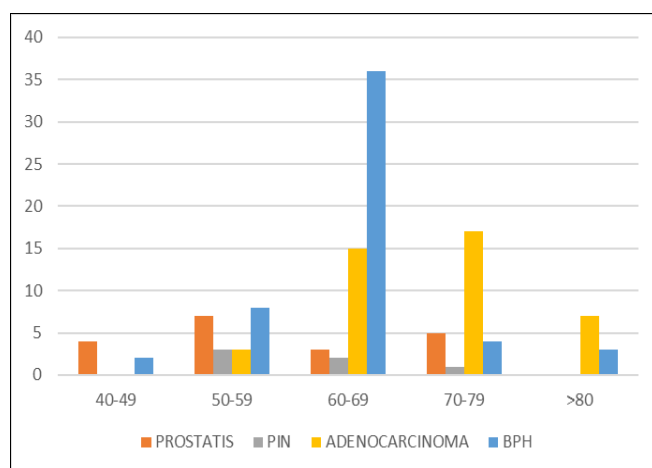


Observation

- The table and graph showed that the most common pathology in our study was BPH (44.1%).
- This was followed by prostate adenocarcinoma (35.0%)
- Prostatitis category is accounted for (15.9%) in study.
- PIN category is accounted for (5%) in study.

3. Age wise distribution of prostate diseases

Age	BPH	Prostatitis	Pin	Adenocarcinoma
40-49	2	4	0	0
50-59	8	7	3	3
60-69	36	3	2	15
70-79	4	5	1	17
>80	3	0	0	7



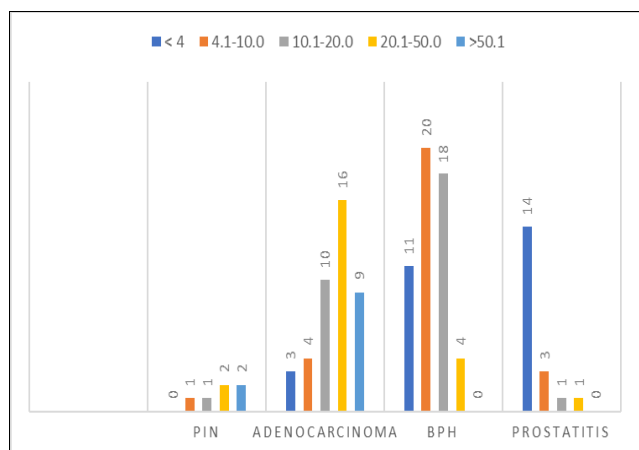
Observation

- In our study, 36 patients with BPH belong to the 60-69 age group, followed by 4 patients in the 50-59 age group, 4 patients in the 70-79 years age group, 3 patients in the more than 80 years age group and only 2 patients in the 40-49 years age group.
- For adenocarcinoma scenario, 17 patients belong to age group 70-79 years, followed by 60-69 years with 15 patients, followed by more than 80 years with 7 patients and lastly and only 3 patients in 50-59 years of age

- group.
- Maximum patients with prostatitis 7 belong to the 50-59 age group.
- Patients with PIN belong to only age groups, 50-59 years, 60-69 years and 70-79 years age groups.

3. S.PSA level in various prostatic pathologies

PSA level (ng/ml)	BPH	Prostatitis	Pin	Adenocarcinoma
< 4	11	14	0	3
4.1-10.0	20	3	1	4
10.1-20.0	18	1	1	10
20.1-50.0	4	1	2	16
>50.1	0	0	2	9

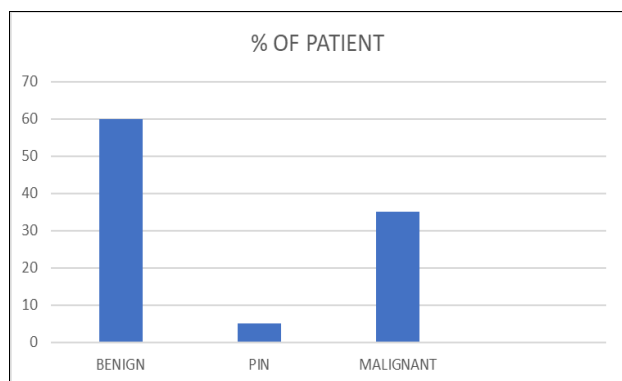


Observation

- In this study, most patients (20) with BPH had PSA levels between 4-10 ng/ml & 11 of patients had PSA level <4 ng/ml.
- In our study, most patients (16) with carcinoma had PSA levels of 20.1-50.0 ng/ml, followed by 10 patients with PSA levels 10.1-20.0 ng/ml.
- In this study, most patients (14) with prostatitis had PSA levels between <4 ng/ml.
- In our study total 4 of patients with PIN had PSA level >20.1 ng/ml.

4. Distribution of prostate diseases in benign and malignant category

Categories	No of patient	% of patient
Benign	72	60
Pin	6	5
Malignant	42	35
Total	120	100



Discussion

Prostatic pathology encompasses a range of conditions affecting the prostate gland, with prostate cancer being one of the most significant due to its prevalence & impact on men’s health. The PSA test is a critical tool in the detection & management of prostate disease. The correlation between PSA levels and prostatic pathology is well established, with elevated PSA levels serving as a critical marker for various prostate conditions. However, the interpretation of PSA levels must consider the potential for benign conditions to elevate PSA, as well as limitations in specificity for prostate cancer.

The study aimed to understand the histopathological spectrum of different prostatic lesions, their frequency in age groups, and the correlation of PSA levels with prostatic pathologies. It included 120 cases to investigate how conditions such as BPH, prostatitis, PIN and carcinoma influence PSA levels in the blood. This understanding is crucial for the diagnosis and management of prostatic pathologies.

Distribution of prostatic pathologies in various age groups

Prostate-related diseases are most common in the elderly age group. Incidents of prostatic hyperplasia and malignancy increase with age. The distribution indicates that age is the critical factor in various pathologies, most pathologies occur in the 50 & above age group.

- In our study, most of the case belongs to the age group 60-69(46.7%), which is similar to the findings in studies done by Shahr, karki, Deshpande NS, Dahe SV & Vani B, Kumar D.
- The second most common cases belong to the age group of 70-79(22.5%) similar to the studies done by Shahr, karki, Deshpande NS, Dahe SV & the least number of patients (5%) belonging to 40-49 year age group which can compare with Deshpande NS, Dahe SV & Vani B, Kumae D.

Age (years)	Shah r, Karkis %	Deshpande NS, Dahe SV	Vani B, Kumar D	Present study %
40-49	0	4.76	4	5
50-59	9.3	15.87	26	17.5
60-69	37.2	46.30	33	46.7
70-79	33.4	31.74	19	22.5
>80	13.9	1.59	7	8.3

Distribution of Prostatic Pathology in Benign, Malignant & Pin

- In our study, 60% of cases belong to the Benign category, followed by malignant (35%) & PIN (5%), comparable with Banerjee B, Iqbal BM, and Kumari K, Sharma N.
- In Hirachand S, Dangol UM, 83.5% of cases belong to the benign category, comparable with our study, while the percentages for PIN and malignant cases were equal to 10.1% each.

Type	Banerjee B, Iqbal BM	Hirachand S, Dangol UM	Kumari K, Sharma N	Present Study
Benign	77%	83.5	63.6%	60 %
Malignant	15%	10.1	29%	35 %
PIN	8%	10.1	7.3%	5 %

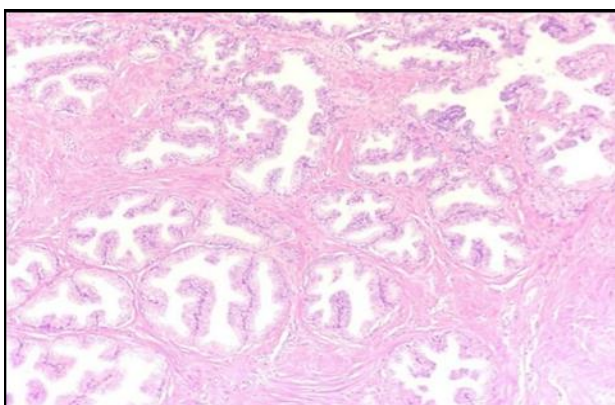
Comparison of PSA level in various Prostatic lesions

In our study majority of the patients with BPH had PSA levels between 4-10 ng/ml which is comparable with the study done by Parthiban R, Roopa AN, in which 45.7% of patients with BPH had PSA levels between 4-10 ng/ml.

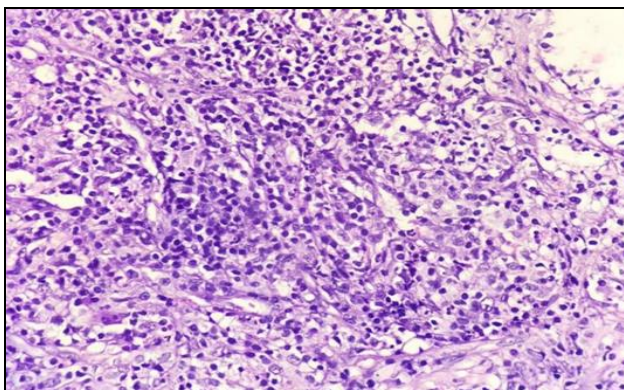
- In our study 16 of patients with carcinoma had PSA levels between 20.1-50 ng/ml, which is comparable with Banerjee B, Iqbal BM (33.3%), & Sihag D, Laddha P (34.1%).

PSA is exclusively secreted by the prostate gland. Its level increases in various prostatic pathologies. The cut of value is generally < 4/ng/ml. its level increases in both benign & malignant conditions. PSA is specific for prostatic tissue, but not specific for prostate cancer, so it may use to identify who may have prostatic cancer but it is not a definitive diagnosis of its own.

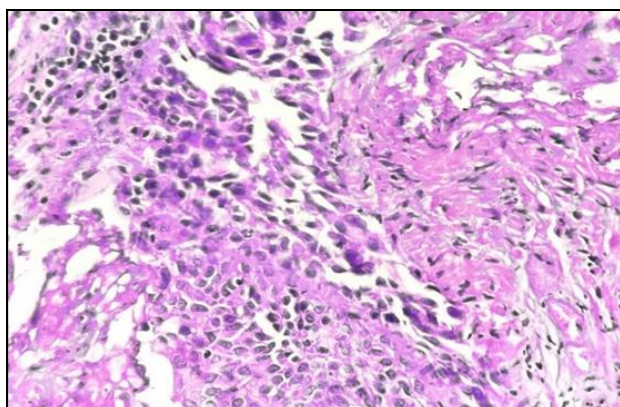
Microscopic images



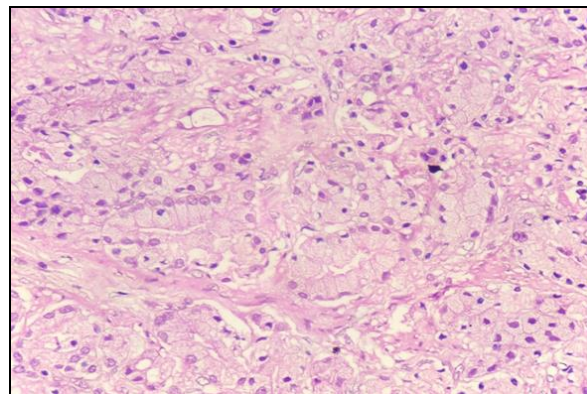
Benign prostatic hyperplasia (BPH)



Prostatitis



Prostatic acinar adenocarcinoma



Prostatic intraepithelial neoplasm (PIN)

Conclusion

This study was conducted in the Pathology Department of B J Medical College, civil hospital Ahmedabad. Study shows that 35% patients are diagnosed with prostate adenocarcinoma, 60% patients are diagnosed with benign conditions (BPH and prostatitis) and only 5% patients of PIN. Out of 120 patients 92(76.7%) patients show increased serum PSA level. It shows Prostate specific antigen (PSA) is specific for the organ prostate, this biochemical marker should be used in conjunction with digital rectal examination and biopsy (Needle or trans-urethral resection specimen) if required, to identify the benign or premalignant condition (PIN). Present study shows that DRE and PSA are the most useful front line methods for assessing before patient goes for MRI. In addition to elevated level of PSA and abnormal DRE with TURP biopsy is most useful and accurate diagnostic method for prostatic lesions.

Conflict of Interest

Not available

Financial Support

Not available

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