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RESEARCH ARTICLE

Histopathological Spectrum of Prostatic Lesions and Correlation with Total Serum Prostate-Specific Antigen: A Prospective Observational Study

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ABSTRACT

Background: Prostatic lesions range from benign hyperplasia to malignant lesions, with serum prostate-specific antigen (PSA) serving as an important biomarker for screening and disease monitoring. However, PSA levels often overlap between benign and malignant conditions, making histopathological confirmation essential.

Objective: To evaluate the histopathological spectrum of prostatic lesions and correlate findings with serum PSA levels.

Methods: This prospective observational study was conducted at DMCH from February 2025 to October 2025, including 90 patients presenting with lower urinary tract symptoms. Serum PSA levels were measured, and histopathological examination was performed on biopsy or resection specimens. Statistical correlation between PSA levels and histological diagnoses were analyzed.

Results: Benign prostatic hyperplasia (BPH) was the most common lesion (62.2%), followed by prostatitis (15.6%), carcinoma (16.7%), and prostatic intraepithelial neoplasia (PIN) (5.5%). Mean PSA levels were significantly higher in malignant lesions (36.8 ± 12.4 ng/mL) compared to benign conditions (6.2 ± 3.1 ng/mL) ($p < 0.001$). A strong positive correlation was observed between elevated PSA levels and malignancy.

Conclusion: PSA is a useful screening tool but lacks specificity. Histopathological examination remains the gold standard for diagnosis. Combined evaluation improves diagnostic accuracy.

Keywords: Prostate, PSA, Histopathology, Prostatic carcinoma, BPH

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Introduction

Prostatic diseases constitute a major health concern among aging males, with increasing prevalence due to longer life expectancy. The prostate gland is susceptible to a variety of pathological changes ranging from inflammatory conditions to neoplastic transformations. Among these, benign prostatic hyperplasia (BPH) and carcinoma of the prostate are the most frequently encountered entities [1].

Serum prostate-specific antigen (PSA), a glycoprotein produced by prostatic epithelial cells, has been widely used as a biomarker for screening and monitoring prostate disorders [2]. Although PSA testing has improved early detection of prostate cancer, its specificity remains limited because elevated levels are also observed in benign conditions such as BPH and prostatitis [3].

Histopathological examination continues to be the definitive method for diagnosing prostatic lesions. The morphological spectrum includes nodular hyperplasia, inflammatory changes, prostatic intraepithelial neoplasia (PIN), and invasive carcinoma [4]. Accurate differentiation is crucial as management strategies differ significantly between benign and malignant lesions.

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Several studies have attempted to correlate serum PSA levels with histopathological findings, yet variability

persists due to overlapping values [5–7]. Therefore, a comprehensive evaluation integrating clinical, biochemical, and histological data is essential.

This study aims to analyze the histopathological spectrum of prostatic lesions and assess their correlation with serum PSA levels in a tertiary care setting.

Materials and Methods

Study Design

Prospective observational study

Study Setting

Department of Pathology, DMCH

Study Duration

February 2025 to October 2025

Sample Size

90 patients

Inclusion Criteria

- Male patients aged >40 years
- Patients presenting with lower urinary tract symptoms
- Patients undergoing prostate biopsy or TURP

Exclusion Criteria

- Previously diagnosed prostate carcinoma under treatment
- Inadequate biopsy samples

Data Collection

- Clinical history and examination
- Serum PSA estimation (ng/mL)
- Histopathological evaluation of prostate tissue

Histopathological Classification

- Benign Prostatic Hyperplasia (BPH)
- Prostatitis
- Prostatic intraepithelial neoplasia (PIN)
- Carcinoma

Statistical Analysis

- Data analyzed using SPSS
- Mean ± standard deviation calculated
- Chi-square test and ANOVA applied
- p-value < 0.05 considered significant

Results

A total of 90 patients were included in the present study. The data were analyzed with respect to age distribution, histopathological diagnosis, and serum prostate-specific antigen (PSA) levels.

The age-wise distribution of patients is presented in Table 1. The majority of cases were observed in the 61–70 years age group (38.9%), followed by 51–60 years (27.8%). Patients above 70 years constituted 22.2% of the study population, while only 11.1% were in the 40–50 years category.

Table 1: Age Distribution of Patients (n = 90)

Age group (years)	*Number of cases*	*Percentage (%)*
40–50	10	11.1
51–60	25	27.8
61–70	35	38.9
>70	20	22.2

The spectrum of histopathological lesions is summarized in Table 2. Benign prostatic hyperplasia (BPH) was the most frequently encountered lesion, accounting for 62.2% of cases. Prostatitis constituted 15.6%, while prostatic intraepithelial neoplasia (PIN) represented 5.5% of cases. Malignant lesions (prostatic carcinoma) were identified in 16.7% of patients.

Table 2: Histopathological Spectrum of Prostatic Lesions

Lesion type	*Number of cases*	*Percentage (%)*
BPH	56	62.2
Prostatitis	14	15.6
PIN	5	5.5
Carcinoma	15	16.7

The distribution of various prostatic lesions is graphically illustrated in Figure 1, which demonstrates the predominance of benign lesions over malignant ones.

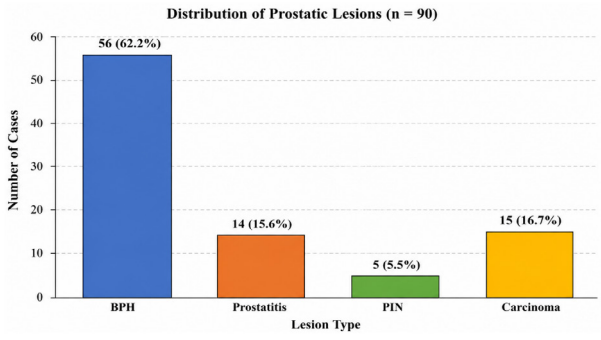

Figure 1: Distribution of Prostatic Lesions

Serum PSA levels across different histopathological categories are detailed in **Table 3**. The mean PSA value was lowest in BPH cases (6.2 ± 3.1 ng/mL) and highest in carcinoma cases (36.8 ± 12.4 ng/mL). Intermediate values were observed in prostatitis and PIN cases.

Table 3: Serum PSA Levels in Different Prostatic Lesions

Lesion type	*Mean PSA (ng/mL)*	*Standard deviation*
BPH	6.2	3.1
Prostatitis	8.5	4.2
PIN	12.4	5.3
Carcinoma	36.8	12.4

A graphical comparison of PSA levels among different lesions is depicted in Figure 2, highlighting significantly elevated levels in malignant cases.

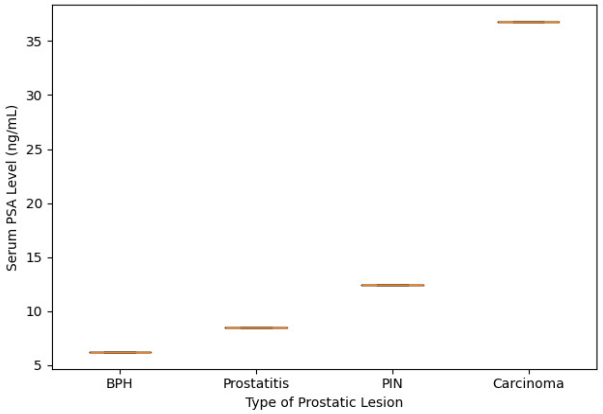

Figure 2: Comparison of Serum PSA Levels Across Lesions

The relationship between PSA categories and histopathological diagnosis is shown in Table 4. All patients with PSA levels below 4 ng/mL had benign lesions. In the PSA range of 4–10 ng/mL, both benign and malignant lesions were identified, indicating overlap between the two groups. Notably, the majority of malignant lesions were associated with PSA levels greater than 10 ng/mL, demonstrating a strong positive correlation between elevated PSA levels and prostatic malignancy.

Table 4: Correlation Between PSA Levels and Histopathological Diagnosis

PSA Range	*Benign*	*Malignant*	*Total*
<4	20	0	20
4–10	30	2	32
>10	25	13	38

Statistical analysis revealed a significant association between serum PSA levels and histopathological diagnosis (Chi-square = 18.72, $p = 0.0001$). This indicates that higher PSA levels are strongly correlated with malignant lesions.

Overall, the results demonstrate that while PSA levels tend to increase with disease severity, there is a considerable overlap between benign and malignant conditions, emphasizing the importance of histopathological confirmation.

Discussion

The present study demonstrates that BPH remains the most prevalent prostatic lesion, consistent with findings from earlier studies [8,9]. The higher incidence in the 6th and 7th decades reflects the age-related hormonal influence on prostatic growth [10].

Serum PSA is widely used in clinical practice; however, its diagnostic limitations are evident. In this study, PSA levels were significantly elevated in malignant cases compared to benign lesions ($p < 0.001$), aligning with previous reports [11,12]. Nevertheless, overlapping PSA levels were observed, particularly in prostatitis and BPH, supporting the notion that PSA lacks absolute specificity [13].

Prostatitis cases demonstrated moderately elevated PSA levels due to inflammation-induced epithelial disruption [14]. Similarly, PIN cases showed intermediate PSA values, indicating their premalignant potential [15].

The statistical association between PSA levels and carcinoma was strong, emphasizing its role as a screening tool. However, reliance solely on PSA can lead to overdiagnosis or unnecessary biopsies [16,17]. Histopathological examination remains indispensable for definitive diagnosis.

Comparative studies have reported similar trends, with carcinoma cases consistently exhibiting higher PSA values [18–20]. The variability in PSA levels underscores the importance of combining clinical evaluation, imaging, and histology for accurate diagnosis [21].

The findings of this study reinforce that PSA should be interpreted cautiously and always in conjunction with histopathological evidence [22–25].

Conclusion

The findings of this study indicate that benign prostatic hyperplasia is the most frequently encountered prostatic lesion among the study population. A marked elevation in serum prostate-specific antigen levels was observed in malignant cases when compared to benign conditions,

highlighting its value as a screening marker. However, the overlap in PSA values between benign and malignant lesions limits its diagnostic specificity when used in isolation. Therefore, reliance solely on PSA estimation may lead to diagnostic uncertainty. Histopathological examination continues to serve as the definitive method for accurate diagnosis of prostatic lesions. An integrated approach combining clinical assessment, serum PSA evaluation, and histopathological analysis provides a more reliable and precise diagnostic framework, ultimately improving patient management outcomes.

References

1. McNeal JE. Regional morphology and pathology of the prostate. Am J Clin Pathol. 1968;49(3):347–357.
2. Neeraj Kumar Singh, Vatsala Kishore, & Dhananjay S Kotasthane. Evaluation of Spectrum of Prostatic Biopsies Using the Revised Gleason Grading System and Prostate Specific Antigen Assay. *International Journal of Health and Clinical Research*, 2022;5(1), 461–465.
3. Stamey TA, Yang N, Hay AR, McNeal JE, Freiha FS, Redwine EA. Prostate-specific antigen as a serum marker for adenocarcinoma of the prostate. N Engl J Med. 1987;317(15):909–916.
4. Epstein JI. An update of the Gleason grading system. J Urol. 2010;183(2):433–440.
5. Catalona WJ, Richie JP, Ahmann FR, Hudson MA, Scardino PT, Flanigan RC, et al. Comparison of digital rectal examination and serum PSA in early detection of prostate cancer. N Engl J Med. 1994;324(17):1156–1161.
6. Oesterling JE, Jacobsen SJ, Chute CG, Guess HA, Girman CJ, Panser LA, et al. Serum PSA in a community-based population. JAMA. 1993;270(7):860–864.
7. Carter HB, Pearson JD, Metter EJ, Brant LJ, Chan DW, Andres R, et al. Longitudinal evaluation of PSA levels. JAMA. 1992;267(16):2215–2220.
8. Berry SJ, Coffey DS, Walsh PC, Ewing LL. The development of human benign prostatic hyperplasia with age. J Urol. 1984;132(3):474–479.
9. Roehrborn CG. Pathology of benign prostatic hyperplasia. Int J Impot Res. 2008;20(Suppl 3):S11–S18.
10. Harman SM, Metter EJ, Tobin JD, Pearson J, Blackman MR. Longitudinal effects of aging on serum testosterone levels. J Clin Endocrinol Metab. 2001;86(2):724–731.
11. Partin AW, Oesterling JE, Epstein JI, Horton R, Walsh PC. Influence of age and PSA on prostate cancer risk. J Urol. 1993;150(1):110–114.
12. Lilja H, Ulmert D, Vickers AJ. Prostate-specific antigen and prostate cancer. Nat Rev Cancer. 2008;8(4):268–278.
13. Nadler RB, Humphrey PA, Smith DS, Catalona WJ, Ratliff TL. Effect of inflammation on PSA levels. J Urol. 1995;154(2):407–413.
14. Pansadoro V, Emiliozzi P, Defidio L, Scarpone P, Pansadoro A, Florio A. Prostate-specific antigen and prostatitis. Urology. 1996;47(4):552–557.
15. Bostwick DG. Prostatic intraepithelial neoplasia: current concepts. J Cell Biochem Suppl. 1992;16H:10–19.
16. Schröder FH, Hugosson J, Roobol MJ, Tammela TL, Ciatto S, Nelen V, et al. Screening and prostate cancer mortality. N Engl J Med. 2009;360(13):1320–1328.
17. Andriole GL, Crawford ED, Grubb RL, Buys SS, Chia D, Church TR, et al. Mortality results from a randomized prostate cancer screening trial. N Engl J Med. 2009;360(13):1310–1319.
18. Thompson IM, Pauler DK, Goodman PJ, Tangen CM, Lucia MS, Parnes HL, et al. Prevalence of prostate cancer among men with low PSA levels. N Engl J Med. 2004;350(22):2239–2246.
19. Loeb S, Catalona WJ. What to do with an abnormal PSA test. Oncologist. 2008;13(3):299–305.
20. Heidenreich A, Bellmunt J, Bolla M, Joniau S, Mason M, Matveev V, et al. EAU guidelines on prostate cancer. Eur Urol. 2011;59(1):61–71.
21. National Comprehensive Cancer Network. NCCN clinical practice guidelines in oncology: prostate cancer. Version 2023.
22. Mottet N, van den Bergh RCN, Briers E, Bourke L, Cornford P, De Santis M, et al. EAU guidelines on prostate cancer 2023. Eur Urol. 2023;84(2):123–134.
23. Humphrey PA. Histopathology of prostate cancer. Cold Spring Harb Perspect Med. 2017;7(10):a030411.
24. Montironi R, Mazzucchelli R, Lopez-Beltran A, Scarpelli M, Cheng L. Morphological identification of prostatic lesions. Eur Urol. 2011;60(1):125–133.
25. Moch H, Humphrey PA, Ulbright TM, Reuter VE. WHO classification of tumours of the urinary system and male genital organs. 4th ed. Lyon: IARC Press; 2016.