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Research Article

HISTOPATHOLOGICAL SPECTRUM OF PROSTATIC LESIONS AND THEIR CORRELATION WITH SERUM PROSTATE SPECIFIC ANTIGEN LEVELS

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ABSTRACT

Objectives: The present study is conducted to find out the histopathological spectrum of different prostatic biopsies and compare them with respective serum prostate-specific antigen (PSA) levels and grading, scoring of malignant lesions according to Gleason's group grading system.

Methods: A total 165 prostatic biopsies from patients of >50 years of age groups were included in the study. This cross-sectional study was conducted in the Department of Pathology, R.N.T. Medical College, Udaipur, over a period of 1 year. The specimens were examined for various prostatic pathologies by doing histopathological examination and their serum PSA values were correlated.

Results: On histopathological examination, 76.9% of cases were of benign lesions, 14% of cases had prostatic malignancy, 6.6% of cases of inflammatory lesions, and 2.4% of cases of prostatic intraepithelial neoplasia. Majority of inflammatory lesions, prostate intraepithelial neoplasia, benign prostatic hyperplasia (BPH), and BPH with prostatitis had PSA level <4 ng/mL. In malignant cases, majority had PSA levels above 10 ng/mL. In prostatic adenocarcinoma, 56.32% of cases were found moderately differentiated grade (G2) followed by 30.43% of cases were of well-differentiated grade (G1) and 13.04% of cases of poorly differentiated grade (G3-G4).

Conclusion: The study showed a statistically positive correlation between histological diagnosis and serum PSA level.

Keywords: Prostate, Benign prostatic hyperplasia, Prostate-specific antigen, Gleason grade.

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INTRODUCTION

Prostatic pathologies are commonly seen in elderly men with benign prostatic hyperplasia (BPH) being the commonest [1]. Prostatomegaly is a leading cause of symptom associated with lower urinary tract obstruction in men above 50 years of life. The most common cause of prostatomegaly is BPH, but many cases of prostatic malignancy were also found [2,3]. The prostate gland has three major glandular regions- the central zone, peripheral zone, and the transition zone, which differ biochemically and histologically. The transition zone is the main site of origin of benign prostate hyperplasia. The peripheral zone is the most common site for developing prostate carcinomas [4].

PSA is most important and clinically useful biomarker for prostate [5]. Normal levels of PSA are usually <4 ng/mL, but they vary according to the age of patients [6].

PSA is not a tumor-specific antigen as it is increased in both benign and malignant conditions but more significantly increased by malignant tissue [7]. The cell integrity is lost due to many pathological processes which cause the release of prostate-specific antigen (PSA) into circulation [8-10]. The cell damage occurs due to bacterial infection, prostate infarction, and malignancy [11]. The development of carcinoma prostate is caused by many mutation and epigenetic changes, leading to an activation of tumor suppressor genes and activation of oncogenes [12].

In current practice, the most common tool for diagnosis of prostate cancer are digital rectal examination (DRE) and serum prostate antigen (PSA) test. The combination of both DRE and PSA testing leads to greater detection of prostate cancer. If abnormal results are shown on both tests, a prostate biopsy is recommended for a definitive tissue diagnosis of prostate cancer.

Due to simplicity and cost effectiveness which are the essential characteristics of a screening test, PSA remains essential for prostate cancer diagnosis and management [13].

Prostatic biopsies are increasingly being used to diagnose prostatic carcinoma. Once adenocarcinoma is diagnosed, it is graded using Gleason scoring and group grade system. Grading is important in prostatic cancer because grade and stage are the best prognostic tool in prostatic malignancy [14].

METHODS

The present cross-sectional study was conducted in the Department of Pathology, R.N.T. Medical College, Udaipur, over a period of 1 year from July 2021 to July 2022. The study was started after obtaining clearance from the institutional ethical committee. A total of 165 prostatic biopsies from patients of >50 years of age groups were included in the study. Relevant clinical and radiological details and pre-operative PSA were collected from medical records. These patients were classified in different types of prostatic lesions based on histopathological diagnosis of prostatic biopsies.

All the cases of prostate disease presenting to Urology Department and undergoing surgery during the study period were taken. Prostate biopsies for the study were obtained by transureteral resection (TURP) or transrectal tru-cut biopsy which were performed by surgeons and radiologist. PSA values of these cases were estimated using a chemiluminescent assay. These biopsies were fixed overnight in 10% formalin, processed in an automatic tissue processor followed by impregnation in wax. The wax block was cut in 4–5 micron section. The diagnosis in all cases was made on hematoxylin and eosin stain, section was mounted and examined under light microscope.

RESULTS

We received total 165 prostatic biopsies from July 2021 to July 2022 at our Department of Pathology of R. N. T. Medical College Udaipur. Table 1 shows histopathological examination of total 165 cases, out of total 127 (76.96%) cases were found benign, 23 (14.07%) cases were found malignant and 11 (6.66%) cases were found inflammatory lesions, and 2.4% cases were of prostatic intraepithelial neoplasia.

In present study, we found that BPH, BPH with prostatitis, and prostate intraepithelial neoplasia (PIN) lesions were most commonly associated with 61–70 year of age group and malignancy was most prevalent in 71–80 year of age group.

BPH, BPH with prostatitis, inflammatory lesion, and PIN majority had PSA level <4 ng/mL. In malignant cases, majority had PSA level above 10 ng/mL.

Eleven cases (47.82%) of carcinoma prostate cases were found to be associated with serum PSA level >100 ng/mL followed by 5 (21.73%) cases with PSA level in range of 80.1–100.0 ng/mL, 3 (13.04%) cases were found to be associated with PSA level 40.1.60.0 ng/mL and 2 (8.69%) cases with PSA level between 60.1 ng/mL and 80 ng/mL, 1 case (4.34%) cases with PSA level between 10.1 ng/mL and 20 ng/mL, and last 1 case with PSA level with 4.1–10 ng/mL. On statistical testing, PSA level >10 ng/mL is found to be highly suggestive of malignant prostatic lesion ($p \leq 0.001$). On considering serum PSA cutoff value 9.6 ng/mL, we found its sensitivity 100%, specificity 99.28%, and positive predictive value is 96.30%.

Fig. 1 shows majority of 13 (48.14%) cases had Gleason score 7 followed by 7 (25.92%) cases with Gleason score 6, 2 (7.40%) cases with Gleason score 8, and least 1 (3.70%) case with Gleason score 9.

Fig. 2. shows epithelial hyperplasia with variable sized glandular structure lined by basal and secretory cells and pappilary infoldings, corpora amylacea at some places.

Fig. 3 shows hyperplastic variable sized glands and stroma showing lymphocyte aggregates.

Fig. 4 shows predominantly primary pattern of well formed gland (pattern 3) and secondary pattern of fused glands, showing nuclear enlargement and nuclear pleomorphism, absence of basal layer and stromal infiltration.

Table 2 shows the evaluation of histological grade in malignant cases. We found majority of 13 (56.32%) cases were moderately differentiated (G2) followed by 7 (30.43%) cases of well-differentiated grade (G1) and 3 (13.04%) cases were diagnosed with poorly differentiated (G3-G4).

About 78.26% of cases of prostatic malignancy had symptom of urinary frequency followed by hesitancy (73.91%), urinary urgency (60.86%), and poor stream (52.17%). Dysuria and hematuria had least cases, 17.39% and 13.04%, respectively.

On USG examination, prostatomegaly was found in all carcinoma patients and in majority of cases, it was Grade-4 prostatomegaly.

DISCUSSION

In our study, on histological examination of total 165 cases, we found that the majority of cases (127) were benign prostatic lesions, 23 cases were of malignant prostatic lesions, 11 cases were of inflammatory lesions, and four cases had PIN. Inflammatory prostatic lesions are subdivided as BPH with acute prostatitis, chronic non-specific prostatitis, and xanthogranulomatous prostatitis as also reported by and correlated well with studied conducted by Lakhey *et al*. and Wadgaonkar *et al.* [3,15]. They also observed that chronic non-specific prostatitis was the most common inflammatory lesion which was similar to our study. Xanthogranulomatous lesion was not reported in Lakhey *et al*. study whereas no case of acute prostatitis was observed in Wadgaonkar *et al*. [3,15].

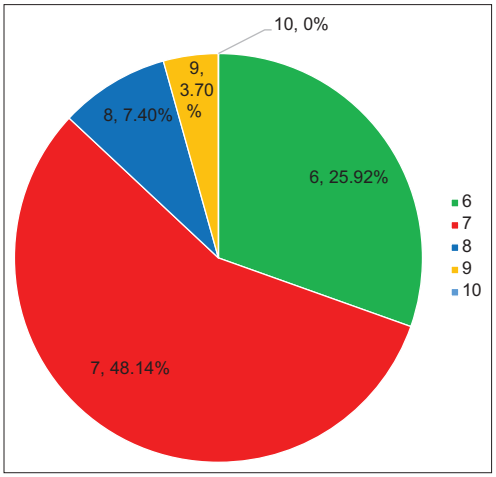

Fig. 1: Gleason score in malignant cases

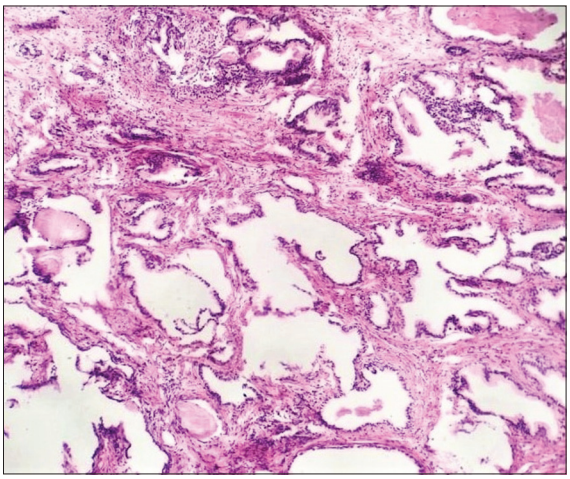

Fig. 2: Benign hyperplasia of prostate (×400: H&E stain)

Table 1: Distribution of final histopathological lesions of the prostatic specimens

S. No.	Histopathological diagnosis	Frequency	%
1	Inflammatory lesion	11	6.6
2	Benign prostatic hyperplasia	56	33.9
3	BPH with chronic non-specific prostatis	65	39.4
4	BPH with acute prostatis	5	3
5	Atypical adenomatous hyperplasia	1	0.6
6.	Prostatatic intraepithelial neoplasia	4	2.4
7.	Adenocarcinoma prostate	23	14.07

BPH: Benign prostatic hyperplasia

Table 2: Histological grade in malignant cases

Gleason grade	Malignant case	Percentage
Gx grade cannot be assessed	0	0
G1 well differentiated	7	30.43
G2 moderate differentiated	13	56.52
G3-4 poorly differentiated	3	13.04
Total	23	100

Adenocarcinoma was the common histological type of malignancy in our study and this comparison was similar to the study done by Jasani *et al.* [16].

In our study, most of cases of carcinoma prostate patients were in age group 71–80 year, followed by 6 (26%) cases in >80 year age group,

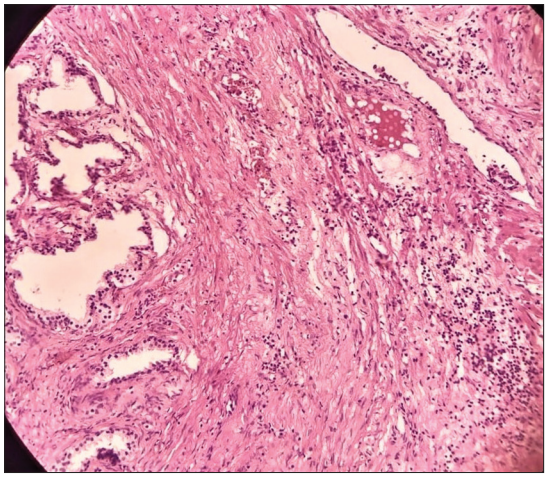

Fig. 3: Benign prostatic hyperplasia with chronic nonspecific prostatitis (×400; H&E stain)

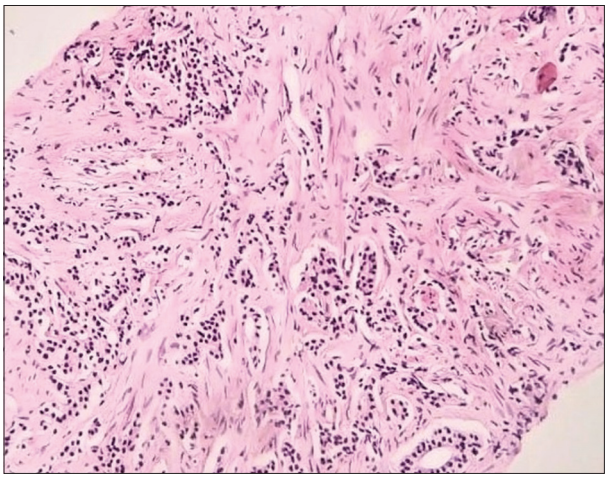

Fig. 4: Prostatic adenocarcinoma: Gleason score - 3+4 (Grade 2); H&E ×400

3 (13%) cases were in 61–70 year age group and 2 (8.6%) cases in 50–60 year age groups. According to Goswami *et al*., prostate cancer is very uncommon before the age 50 years, but its frequency climbs steeply with age to peak in the 9th decade for both incidence and mortality rate [17].

The peak age incidence of malignancy in our study was in 7th decade similar to study done by Wadgaonkar *et al*, [3] Albasri [18] and Kumari *et al*. [19].

Most of the malignant cases were found with PSA level >10 ng/mL. Statistical testing PSA level 10 ng/mL is found to be highly suggestive of malignant prostatic lesion ($p<0.001$). On considering serum PSA cutoff value 9.6 ng/mL, we found its sensitivity 100%, specificity 99.28%, and positive predictive value is 96.30%. While Lakhey *et al*. found the sensitivity of 100%, specificity 49%, and Shetty *et al*. found sensitivity of 96.3% and specificity, positive predictive value and negative predictive value at a cutoff 19.5 ng/mL were 96.3%, 86.18%, 60.47%, and 99.07%, respectively [15,20].

The study of Udeh *et al*. and Stephan *et al*. observed no relationship between increase volume of prostate with that of an increased occurrence of malignant prostatomegaly. The present study also had a similar observation [21,22].

In our study, Gleason score-7 was most-common score. Deshmukh *et al*. found that Gleason score 9 was the most common score and Josephine found that Gleason score 7 was the most common [23,24].

In our study, we found that majority of 13 (56.32%) case were found moderately differentiated (G2) followed by well-differentiated 7 (G1) (30.43%) cases of well-differentiated and least 3 (13.04%) cases were diagnosed with poorly differentiated (G3-G4). Nwafor *et al*. found moderately differentiated PC accounted for 58.1%, while poorly differentiated cases accounted for 33.8% and well-differentiated cases were 8.1% [25]. While Awang *et al*. found 60% of cases in poorly differentiated grade, 26.5% of cases was moderately differentiated [26].

CONCLUSION

Our study shows that carcinoma prostate is more common in age group 71–80 years. Although serum PSA level >10 ng/mL is suggestive but not diagnostic for carcinoma prostate as the higher levels of PSA can also seen in inflammatory conditions like acute prostatitis. In present study, the highest PSA level for benign lesions was 64.4 ng/mL, and lowest PSA level for malignant lesions was 9.8 ng/mL.

On histopathological examination, majority of carcinoma prostate were found to be having Gleason score 7 (moderately differentiated carcinoma). More over positive correlation is seen between levels of total serum PSA and Gleason score and Gleason grade group. However, as the tumor becomes more poorly differentiated, the cells have lost differentiation and it may not correlate with PSA levels.

AUTHORS CONTRIBUTIONS

All authors have contributed equally in the preparation of this manuscript.

CONFLICTS OF INTERESTS

None.

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None.

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