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# Histopathological Study of Prostatic Lesions in Transurethral Resection of Prostate Specimens in Correlation with Serum Prostate Specific Antigen Levels

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## ABSTRACT

**Background:** Diseases of prostate are very common among elderly males and Benign Prostatic Hyperplasia (BPH) is the commonest. Prostate Specific Antigen (PSA) level estimation has become a popular method for screening prostatic lesions. This study was carried out to evaluate the histopathological findings of prostatic lesions and to see the correlation with serum prostate specific antigens.
**Materials and Methods:** Permission was taken from Institutional Review Committee (IRC) of National Medical College before starting the study (Ref. F-NMC/641/079-080). Transurethral Resection of Prostate (TURP) specimens received for histopathological examination in the Department of Pathology from March 2023 to December 2023 were included in the study. Paraffin embedded sections were stained with routine haematoxylin and eosin stain. The PSA levels were recorded before the surgical procedure. Serum PSA level was estimated using chemiluminescent assay. Serum PSA levels were arbitrarily divided into 0 – 4 ng/ml, 4.1 – 10 ng/ml, 10.1 – 20 ng/ml, 20.1 – 30 ng/ml. and > 30 ng/ml.
**Results:** Total Transurethral Resection of Prostate (TURP) specimens received were 60. With 78.3%, benign prostatic hyperplasia was the most common followed by prostatic intraepithelial lesion in 11.7%. and malignancy (prostatic adenocarcinoma) in 10%. PSA levels were increased in prostatic intraepithelial neoplasms and malignancies.
**Conclusion:** PSA is an important marker for prostatic lesions. It is normal to mildly increase in benign conditions (eg. BPH) and markedly increased in malignancies.

***Key Words:*** Benign Prostatic Hyperplasia, Adenocarcinoma prostate, Serum prostate specific antigens, Total Transurethral Resection of Prostate.

## INTRODUCTION

Prostate is a pear-shaped glandular organ which weighs upto 20 gms. It is an exocrine gland and forms a significant component of seminal fluid.[1] Prostate gland histologically consists of compound tubule alveolar glands lined by double layer of cells. The basal layer comprises of low cuboidal epithelium along with dispersed neuroendocrine cells covered by columnar secretory cells. The glandular epithelium secretes PSA. The stroma has abundant smooth muscle fibers.

Prostate encircles the neck of the urinary bladder. Enlargement of prostate due to any cause such as nodular hyperplasia, prostatic intraepithelial neoplasia or carcinoma may cause obstruction in bladder outlet.[2] With increasing age there is tissue remodeling within the prostate. As postulated, the growth is the result of imbalance between apoptotic and proliferative activities which results in net reduction in apoptosis. An histologic analysis showed decreased apoptotic activity in glandular and basal epithelial cells of the prostate. Hence, with increasing age there is a tendency of increasing prostatic volume.[3-5]

Prostate specific antigen ( PSA ) is a glycoprotein produced by the epithelial cells of prostatic tissue with normal levels of 0-4ng/ml.[6] PSA is a useful and important biochemical marker of prostate because it is produced by it and is specific for prostatic tissue.[7] Inspite of close association between increased PSA levels and prostate cancer, there can be different causes of increased PSA level such as benign prostatic hyperplasia, prostatitis, prostatic trauma and prostatic infarction.[8] Frequently encountered lesions of prostate are benign prostatic hyperplasia, prostatitis and carcinoma.[9] Benign prostatic hyperplasia (BPH) represents nodular enlargement of prostate caused by proliferation of both stromal and glandular components. The incidence of BPH increases with age, being 8% during fourth decade, 50% in fifth decade and upto 75% in the eighth decade. Prostatitis occurs in approximately 10% to 15% people.[10]

Prostate cancer is second most common malignancy in men. Prostatic carcinomas are classified depending on morphology and modified Gleason Grading. Gleason score is obtained by combined Gleason grade of Gleason sum. Gleason score ranges from 2 to 10. Primary (predominant) pattern and secondary (worse) patterns are identified and given a score from 1 to 5. [11]

The term prostatic intraepithelial neoplasia was approved. It is defined as cytological alteration in architecture of normal glands and is further categorized into low grade (LGPIN) and high grade (HGPIN).[12]

Transurethral resection of prostate (TURP) is a common urological procedure performed by visualizing the prostate and bladder through the urethra and removing tissues by electrocautery or sharp dissection. It has great impact on prostate and bladder tumour management as it gives the degree of differentiation, depth of tumour invasion, parameters used in diagnosis, treatment and prognosis assessment. [13]

## MATERIALS & METHODS

This was a Quantitative, hospital based descriptive cross-sectional study.

**Sampling Frame:**

TURP specimens received for histopathological examination in the Department of Pathology, National Medical College Teaching Hospital, Birgunj, Nepal for a period of 10 months.

All patients undergoing TURP procedure along with their pre-operative PSA values were included in the study.

Patients unwilling to give consent and patients undergoing prostatic surgery other than TURP procedure, inadequate biopsy were excluded from the study.

## STATISTICAL ANALYSIS

SPSS (Statical Package for Social Science) version 22 was used for data analysis.

## RESULT

Total TURP specimens received were 60 in the department of Pathology at National Medical College and teaching hospital during the study period (April 1, 2023 to 31, January 2024).

Prostatic specimens were diagnosed using histopathological examination as a gold standard.

**Table 1: Age wise distribution of Prostatic Lesions ( n = 60 )**

| Age wise Groups (Years) | Total No. of Patients | BENIGN No. of Patients | Percentage | Prostatic Intraepithelial Neoplasm No. of Patients | Percentage | Malignancy No. of Patients | Percentage |
|---|---|---|---|---|---|---|---|
| 40-50 | 04 | 03 | 6.4 | 0 | 0 | 01 | 16.7 |
| 51-60 | 10 | 09 | 19.1 | 0 | 0 | 01 | 16.7 |
| 61-70 | 17 | 15 | 31.9 | 01 | 14.3 | 01 | 16.7 |
| 71-80 | 20 | 11 | 23.4 | 06 | 85.7 | 03 | 50 |
| 81-90 | 08 | 08 | 13.3 | 0 | 0 | 0 | 0 |
| 91-100 | 01 | 01 | 2.1 | 0 | 0 | 0 | 0 |
| Total | 60 | 47 | 100 | 07 | 100 | 06 | 100 |

The majority of patients were from age group 71 – 80 years (33.3 %) and least were from age groups 91 - 100 years (1.7 %). The mean age was 69.3 & standard deviation was 10.8. (Table 1)

**Table 2: Spectrum of prostatic Lesions (n = 60)**

| S. No | Prostatic Lesions | No. of Patients | % Age |
|---|---|---|---|
| 1 | Benign | 47 | 78.3 |
| | Benign prostatic hyperplasia | 47 | 78.3 |
| 2 | Prostatic Intraepithelial Neoplasia | 07 | 11.7 |
| | a) Low grade prostatic intraepithelial neoplasm | 04 | 6.7 |
| | b) High grade prostatic intraepithelial neoplasm | 03 | 05 |
| 3 | Malignant | 06 | 10 |
| | Adenocarcinoma | 06 | 10 |
| | Total | 60 | 100 |

Out of 60 patients, benign lesions constituted 78.3% cases followed by prostatic intraepithelial neoplasm in 11.75% and malignancy in 10%. Out of 11.7% patients of prostatic intraepithelial neoplasm 57.1% was of low grade prostatic intraepithelial neoplasm and 42.9% of high grade prostatic intraepithelial neoplasm. (Table 2).

10% of the patients had malignancy and all of them (100%) were adenocarcinoma.

**Table 3: Association between Serum Prostate Specific Antigen and prostatic Lesions (n = 60)**

| Serum PSA (ng/ml) | Benign | Prostatic Intraepithelial Neoplasm | Malignancy | Total Patients | P value |
|---|---|---|---|---|---|
| Upto 4 | 19 (40.4%) | 0 (0%) | 0 (0%) | 19 | <0.001 |
| 4.1-10 | 23 (49.1%) | 02 (28.6%) | 0 (0%) | 25 | |
| 10.1-20 | 02 (4.2%) | 05 (71.4%) | 0 (0%) | 07 | |
| 20.1-30 | 01 (2.1%) | 0 (0%) | 0 (0%) | 01 | |
| >30 | 02 (4.2%) | 0 (0%) | 06 (100%) | 08 | |
| Total | 47 (100%) | 07 (100%) | 06 (100%) | 60 | |

Table 3. The results showed that there was significant association between Serum PSA value and diagnosis of prostatic lesions.

The above results shows that benign prostatic hyperplasia was found in 40.4% patients having PSA value between 0-4 ng/ml, 49.1% in range from 4.1-10ng/ml, 4.2% in range from 10.1-20ng/ml & > 30 ng/ml respectively. Serum PSA in the range of 20.1 – 30 ng/ml was seen in one patient (2.1%) diagnosed with benign prostatic hyperplasia.

Similarly, prostatic intraepithelial neoplasm was found in 28.6% patients having PSA value between 4.1-10 ng/ml & 57.14% in PSA value between 10.1-20 ng/ml respectively.

Likewise, Prostatic adenocarcinoma was found in all the patients (100%) having PSA value > 30ng/ml.

**Table 4: Serum PSA levels in different age groups**

| Age | PSA Values (ng/ml) | | | | | |
|---|---|---|---|---|---|---|
| | Upto 4 | 4.1-10 | 10.1-20 | 20.1-30 | >30 | Total |
| 41-50 | 02 (10.5% ) | 0 (0%) | 01 (14.2%) | 0 (0%) | 01 (12.5%) | 04 |
| 51-60 | 03 (15.8% ) | 07 (28) | 0 (0%) | 0 (0%) | 0 (0%) | 10 |
| 61-70 | 07 (36.9% ) | 09 ( 36%) | 0 (0%) | 0 (0%) | 01 (12.5%) | 17 |
| 71-80 | 05 (26.3% ) | 06 (24%) | 04(57.1%) | 0 (0%) | 05 (62.5%) | 20 |
| 81-90 | 02 (10.5 %) | 02 (08%) | 02(28.9%) | 01(100%) | 01 (12.5%) | 08 |
| 91-100 | 0 (0% ) | 01 (04%) | 0 (0%) | 0 (0%) | 0 (0%) | 01 |
| Total | 19 (100%) | 25 (100%) | 07 (100%) | 01 (100%) | 08 (100%) | 60 |

Table 4. The results showed that in age from group 41 – 50 years : PSA 0-4ng/ml was found in 10.5%, PSA in the range of 10.1 – 20 was found in 14.2% and 12.5% in the PSA > 30ng/ml.

Likewise, in age group 51-60 years: PSA value 0-4ng/ml was found in 15.8 %, PSA in the range of 4.1- 10 ng/ml in 28%.

Similarly, in age group 61-70 years: PSA value 0-4ng/ml was found in 36.9 %, PSA in the range of 4.1- 10 ng/ml in 36%. and 12.5% in the PSA > 30ng/ml.

Likewise, in age group 71-80 years: PSA value 0-4ng/ml was found in 26.3 %, PSA in the range of 4.1- 10 ng/ml in 24%, 57.19% in PSA range 10.1-20 ng/ml, 62.5% in PSA value > 30ng/ml.

Likewise, in age group 81-90 years: PSA value 0-4ng/ml was found in 10.5 %, PSA in the range of 4.1- 10 ng/ml in 08%, 28.9% in PSA range 10.1-20 ng/ml, 12.5% in PSA value > 30ng/ml.

Likewise, in age group 91-100 years : PSA value of 4.1- 10 ng/ml was found in 04% patients.

## DISCUSSION

This study was done to correlate between prostate specific antigen levels and prostatic lesions in transurethral resection of prostate specimen. 60 cases were analyzed in this study.

This study correlates well with a study conducted by Nikhil et al.[14] Benign lesions were commonest prostatic lesions in total of 63 patients. 38 (60.32 %) cases were of Benign prostatic hyperplasia (BPH). In the present study 47 (78.3 %) cases were of Benign prostatic hyperplasia (BPH) out of total 60 patients.

Kavita et al[15] in 2018 conducted a study titled "Correlation of serum PSA level with histomorphologic study in prostatic diseases". Benign Prostate Hyperplasia (63.3%) was the commonest lesion followed by malignancy (29.1%) and prostatic intraepithelial neoplasia (7.3%). Serum PSA was increased in 65.5% cases. Mean serum PSA value of BPH with & without inflammation was 10.9ng/ml & 9.8 ng/ml respectively. Mean serum PSA value was 18.9% in Low Grade & 78.5% ng/mlin high grade prostatic intraepithelial neoplasm. Mean serum PSA value in malignancy was 101.2 ng/ml.

A study was conducted by Suspana et al[16] titled "Study of prostatic pathology and its correlation with prostate specific antigen" which was carried out at Kathmandu Medical College and Teaching Hospital, department of Pathology over a period of 2 years. Benign prostatic hyperplasia was the most common histological lesion encountered (n=95; 74.22%). Prostatic adenocarcinomas were seen a decade older than those with benign lesions. Maximum number of the benign cases had the Prostate specific antigen range of 0-7ng/ml. Most of the prostatic intraepithelial neoplasia lesions were seen within the PSA range of 0-7ng/ml and adenocarcinoma in the range of >20ng/ml.

In a study conducted by Sujata et al[17] titled "Evaluation of prostate specific antigen levels and its correlation with histopathological findings" 51 cases of prostatic disease who underwent surgery during the study period with the mean age of 66.57 ± 10.68 years were taken. On histopathological examination, 70.6% had benign prostatic hyperplasia and 17.6% had prostatic adenocarcinoma. Prostate specific antigen level was <4 ng/ml in 45.1% cases and >20.1ng/ml in 15.7%. In case of carcinoma prostate, 88.9% had prostate specific antigen level > 20.1ng/ml and 11.1% had prostate specific antigen level in a range of 10.1- 20 ng/ml. However, in case of high grade prostatic intraepithelial neoplasia (HGPIN), 66.7% had PSA level <4 ng/ml.

According to WHO, the mean incidence of HGPIN in prostatic biopsies is about 9% (range 4% - 16%).[18] Race and geographical location also influence the incidence of PIN. Incidence is highest among American men and significantly lower among Asian men.[19]

Prostatic lesions were categorized as benign, Prostatic Intraepithelial Neoplasm and malignant. Like all other studies benign prostatic hyperplasia was seen as the most common lesion among prostatic diseases.

In the present study maximum number of the benign cases had the serum Prostate specific antigen range of 4.1-10 ng/ml. Prostatic intraepithelial neoplasia (HGPIN) was seen within the PSA range of 4.1-20 ng/ml and adenocarcinomas had PSA value >30ng/ml. The age of patients suffering from prostatic diseases ranged from 40 to 95 years. The maximum number of patients were from age group 71 – 80 years (33.3%) . The peak incidence of benign prostatic hyperplasia in the present study was also seen in the age group 61 – 70 years. Low and high grade Prostatic Intraepithelial lesion was seen in the $6^{th}$ and $7^{th}$ decade respectively. Malignancy was commonest in the $7^{th}$ decade.

Prostate specific antigen is secreted exclusively by prostatic epithelial cells. In various prostatic lesions such as a BPH, prostatitis, PIN and cancer, serum PSA level is increased. Thirty to fifty percentage of patients with BPH have elevated serum PSA concentrations, depending on the size of the prostate and degree of obstruction. In prostatic cancer the concentration is increased in 20-29% of patients, depending on the tumor volume. Measurement of the serum PSA is the most sensitive marker available for monitoring the progression of prostatic cancer.[20]

## CONCLUSION

This study showed significant correlation between serum PSA level and prostatic lesions ($p<0.001$). Benign prostatic hyperplasia (BPH) was the commonest lesion of the prostate. Both benign and malignant lesions of prostate can cause an increase in serum PSA levels but patients with high levels of PSA have more changes of malignancy (Malignant lesions in this study showed PSA level > than 30ng/ml). Serum PSA level cannot be used as a diagnostic tool but can be used as a screening and treatment monitoring tool. Hence, histopathological diagnosis plays a crucial role in the management of patients with prostatic lesions.

### *Declaration by Authors*

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## REFERENCES

1. Yadav M, Desai H, Goswami H. “Study of various histopathological patterns in prostate biopsy’’. Int J Curr Res Rev. 2017;9(21):58-63
2. Begum Z, Attar AH, Tengli MB, Ahmed MM. Study of various histopathological patterns in TURP specimens and incidental detection of carcinoma prostate. Indian J Pathology and oncology 2015;2:303-8.
3. Briganti A, Capitanio U, Suardi N, Gallina A, Salonia A, Bianchi M. Benign prostatic hyperplasia and its etiologies. Eur Urol 2009; 8: 865-871.
4. Untergasser G, MadersbacherS,Berger P. Benign prostatic hyperplasia: age related tissue remodeling. Exp Gerontol 2005; 40: 121-128.
5. Konwar R, Chattopadhyay N, Bid HK. Genetic polymorphism and pathogenesis of benign prostatic hyperplasia. BJU Int 2008;102:536- 44.
6. Wang MC. Purification of human prostate specific antigen. Invest Urol. 1979;17:159-63.
7. Jasani J.H. Diagnostic utility of prostate specific antigen for detection of prostatic lesions. IJBAR. 2012;3:268-72.
8. Ozcana T, Bizlub M, Musluc N, Gozukara KH, Seiysa S, Aksay B. Elevation of serum and free prostate specific antigen levels after stent implantation in patients with coronary artery disease. Swiss Med Wkly. 2009;139:672-75.
9. Anunobi CC. Prostate disease in Lagos, Nigeria: a histologic study with tPSA correlation. Nigerian Postgrad Med J. 2011;18:98-104.
10. Harik LR, O’Toole KM. Nonneoplastic lesions of the prostate and bladder. Arch Pathol Lab Med. 2012;136(7):721-34.

11. Epstein JI. An update of the Gleason Grading System. J Urol. 2010;183(2):433-40.
12. Jonathan I. Epstein. An Update of the Gleason Grading System. 2010. Journal of Urology. Available from :http://dx.doi.org/10.1016/j.juro.2009.10.046
13. Sharma A, Sharma M, Gandhi S, Khajuria A, Goswami KC. Histomorphological spectrum of prostatic lesions: a retrospective analysis of transurethral resection of prostate specimens. Int J Res Med Sci. 2017;5(6):33-38
14. Sadhana H, BugeAk. Histopathological spectrum of prostatic lesions:A retrospective analysis of transurethral resection of prostate specimens in a tertiary care hospital.2019; 8-11
15. Deshpande NS, Dahe SV, Munemane AB. Histopathological study of prostatic lesionsin correlation with serum prostate specific antigen levels in elderly men. International Journal of Research in Medical Sciences. 2020;8(9):3304-3308
16. Kumari K, Sharma N, Sharma SK, Jaswal S, Barwal K. Correlation of serum PSA level with histomorphologic study in prostatic diseases. Indian Journal of Pathology and Oncology. 20185(4)613-618
17. Jayapradeep DP, Prakash VB, Philipose TR, Pai MR. Histomorphologic correlation of PSA levels in prostatic pathology. National Journal of Laboratory medicine.2017; 6(4) 28-32
18. Hirachand S, Dangol UMS, Pradhanang S, Acharya S. Study of prostatic pathology and its correlation with prostate specific antigen. Journal of Pathology of Nepal. 2017; 7: 1074 – 1077
19. Moch H, Amin MB, Berney DM, Comperat EM, Gill AJ, Hartmann A, Menon S, Raspollini MR, Rubin MA, Srigley JR, Hoon Tan P, Tickoo SK, Tsuzuki T, Turajlic S, Cree I, Netto GJ. The 2022 World Health Organization Classification of Tumours of the Urinary System and Male Genital Organs-Part-A: Renal, Penile and Testicular Tumours. Eur Urol. 2022 Nov;82(5):458-468.
20. Sakr WA, Billis A, Ekman P, Wilt T, Bostwick DG. Epidemiology of high grade prostatic intraepithelial neoplasia. Scand J Urol Nephrol . 2000;34(205): 11-18
21. Catalona WJ, Smith Ds, Ratliff TL, Dodds KM, Coplen DE, Yuan JJ et al. Measurement of prostate-specific antigen in serum as a screening test for prostate cancer. 1991;324(17):1156-61.

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