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Research Article

CORRELATION OF SERUM PROSTATE SPECIFIC ANTIGEN WITH GLEASON'S SCORE/GRADE IN PROSTATE CARCINOMA PATIENTS

Dr. Hukam Singh Meena[1]; Dr Aashita Thakur[2]; Dr. Reena Jadhav[3]; Prof. Dr. Meena Mittal[4]

[1] Post Graduate Student, Department of Pathology, M.G.M. Medical College Indore, Madhya Pradesh, India
[2] Post Graduate Student, Department of Pathology, M.G.M. Medical College Indore, Madhya Pradesh, India
[3] Senior Resident, Department of Pathology, M.G.M. Medical College Indore, Madhya Pradesh, India
[4] Professor, Department of Pathology, M.G.M. Medical College Indore, Madhya Pradesh, India

Corresponding Author:

Dr. Hukam Singh Meena
Post Graduate Student, Department of Pathology, M.G.M. Medical College Indore, Madhya Pradesh, India.

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ABSTRACT

Prostate cancer is one of the leading causes of cancer-related morbidity in men worldwide[1][2]. The diagnosis and prognosis of prostate cancer rely on clinical, biochemical, and histological parameters. Prostate-specific antigen (PSA) is a major screening tool for prostate cancer, while
trans rectal ultra sound (TRUS)-guided needle biopsies of prostate are considered gold standard for the diagnosis of prostate cancers. Gleason grading is a histopathological evaluation that classifies prostate cancer based on glandular morphology, reflecting tumor aggressiveness[1][2].
The aim of the study is to assess the correlation between serum PSA levels and histological Gleason scores in prostate cancer patients, evaluating their combined utility in risk stratification and prognosis[1][3][5]. The study was carried out at the Department of Pathology, MGM Medical College Indore (M.P.). This retrospective study was conducted based on the analysis of hematoxylin and eosin-stained histological slides prepared from paraffin-embedded tissue specimen of 30 prostate biopsies from January 2023 to December 2023 and the histology requestion form filled by the attending clinician from where the values of the serum PSA concentration of the patients were obtained. Serum PSA levels were assessed and prostate biopsies were graded according to the Gleason scoring system. Raised serum PSA level were divided into 3 categories: mild (≥ 4–50 ng/ml), moderate (> 50–100 ng/ml) and marked elevation (> 100ng/ml). Out of 30 cases, 06 (20%) cases have serum PSA levels between ≥ 4–50 ng/ml and had Gleason grade 2. 16(53.3%) cases have serum PSA levels between ≥ 4–50 ng/ml and had Gleason grade 3 and 4. 08(26.6%) cases have serum PSA (>100 ng/ml) and had Gleason grade 5. Higher PSA levels were significantly associated with higher Gleason grades, indicating a relationship between serum PSA concentration and tumor aggressiveness.
PSA level is one of the most important, accurate early clinical marker to assess the individual risk of prostate cancer. PSA values correlated significantly with Gleason's score/grade of prostatic carcinoma.

Keywords*: Prostate cancer, PSA, Gleason score, Prognostic factors.*

INTRODUCTION:

Adenocarcinoma of the prostate is the second most common cause of cancer and sixth leading cause of cancer-related deaths in men worldwide.
Incidences in India - The incidence rate of prostate cancer is estimated to be 9 per 100,000 men in the whole of India. Over 95% of prostatic cancers are adenocarcinomas that arise in prostate acini.

Two central parameters for diagnostic and prognostic evaluation are Prostate-Specific Antigen (PSA) and Gleason grading[3][8]. PSA, a glycoprotein produced by prostatic tissue, increases in prostatic diseases, while the Gleason grading

system, based on histological architecture, predicts tumor aggressiveness[7][9]. Clinically prostate cancer may be asymptomatic and its natural progression is relatively slow. Usually it is detected by suspicious nodule on digital rectal examination (DRE) or raised prostate specific antigen (PSA) levels. The serum PSA levels get elevated in various conditions but are widely used to screen for prostate cancer. The histological grading was done by WHO Grade Group system based on Gleason Score. Cases having Gleason Score ≥ 6 were considered as malignant.

AIMS AND OBJECTIVES:
To correlate serum PSA levels with Gleason score/ grade in various neoplastic prostatic biopsies.
To determine histological types of adenocarcinoma prostate related with PSA.

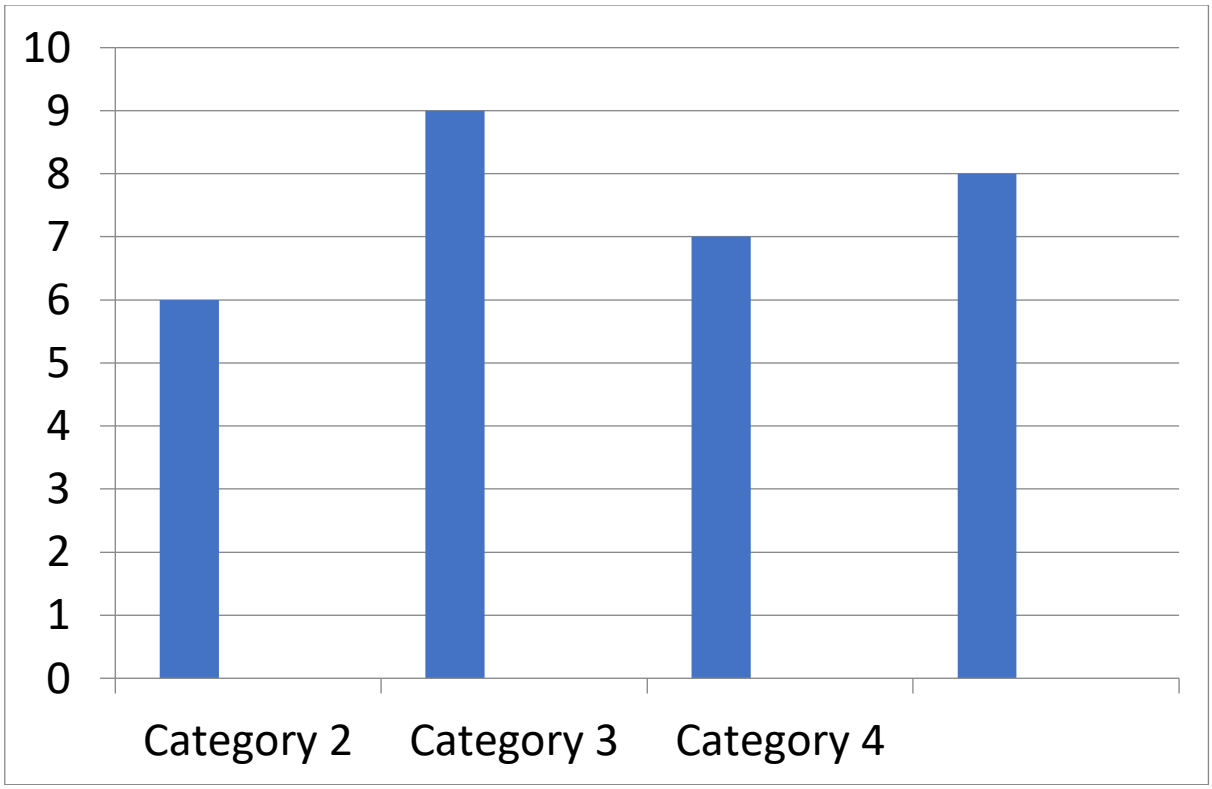
MATERIALS AND METHODS:
The study was carried out at the Department of Pathology, MGM Medical College Indore (M.P.) from January 2023 to December 2023.

The study included 30 cases. The patients were in age group of 45-95 years with a mean age of 68.5 years. Serum PSA level were assessed and correlated with Gleason score/grade of reporting prostate carcinoma.

Serum PSA measured by chemiluminescence or sandwich immunoassay methods[1][5]. Raised serum PSA level were divided into mild (≥ 4–50 ng/ml), moderate (> 50–100 ng/ml) and marked elevations (> 100ng/ml).

Biopsy specimens were evaluated according to standard Gleason grading (original and modified systems), sometimes grouped into 3–5 grade categories[10][11][5]. Correlation assessed via Spearman's rank and Pearson's coefficient; statistical significance ($p<0.05$) determined[1][3][4]

RESULT:
The patients were in age group of 45-95 years with a mean age of 68.5 years.
Out of 30 cases, 06 (20%) cases have serum PSA levels between ≥ 4–50 ng/ml and had Gleason grade 2. 16(53.3%) cases have serum PSA levels between ≥ 4–50 ng/ml and had of Gleason grade 3 and 4. 08(26.6%) cases have serum PSA (>100 ng/ml) and had Gleason grade 5.



Gleasons grading for prostate cancer

- Grade Group I (Gleason Score ≤ 6) – Only individual discrete well-formed glands.
- Grade Group II (Gleason Score 3+4=7) – Predominantly well-formed glands with a lesser component of poorly-formed/fused/cribriform glands.
- Grade Group III (Gleason Score 4+3=7) – Predominantly poorly-formed/fused/cribriform glands with lesser component of well-formed glands

- Grade Group IV (Gleason Score 8) Only poorly formed/fused/cribriform glands or Predominantly well-formed glands and lesser component lacking glands or Predominantly lacking glands and lesser component of well-formed glands.
- Grade Group V (Gleason Score 9-10) – Lack of gland formation (or with necrosis) with or without poorly-formed/fused/cribriform glands.

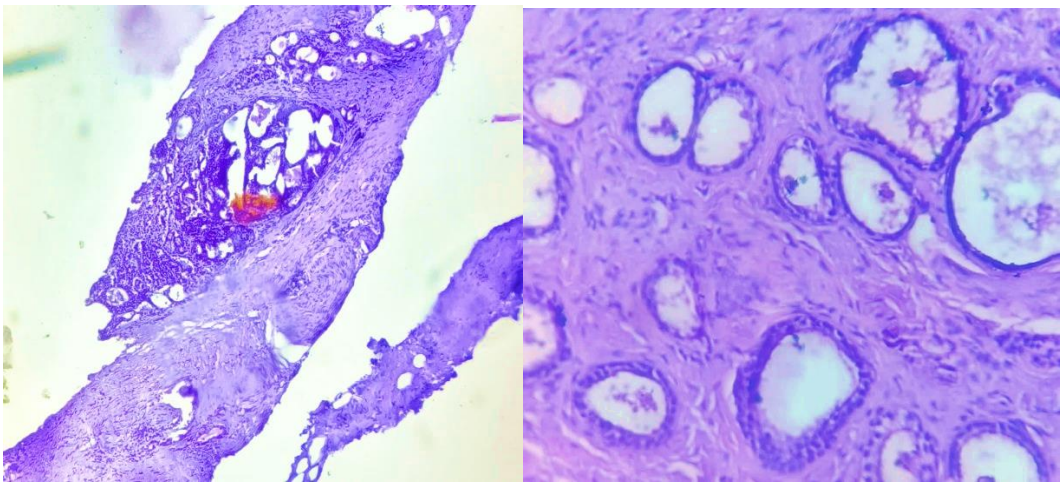
AGE WISE DISTRIBUTION OF PROSTATE ADENOCARCINOMA

AGE	GLEASONS GRADE 2	GLEASONS GRADE 3	GLEASONS GRADE 4	GLEASONS GRADE 5	TOTAL NUMBER OF CASE
45- 55	03	01	00	00	04
56-65	01	02	03	01	07
66-75	02	03	04	04	13
76-85	00	01	01	02	04
86-95	00	00	01	01	02
TOTAL	06	07	09	08	30

TO CORRELATE SERUM PSA LEVELS WITH GLEASON SCORE/ GRADE

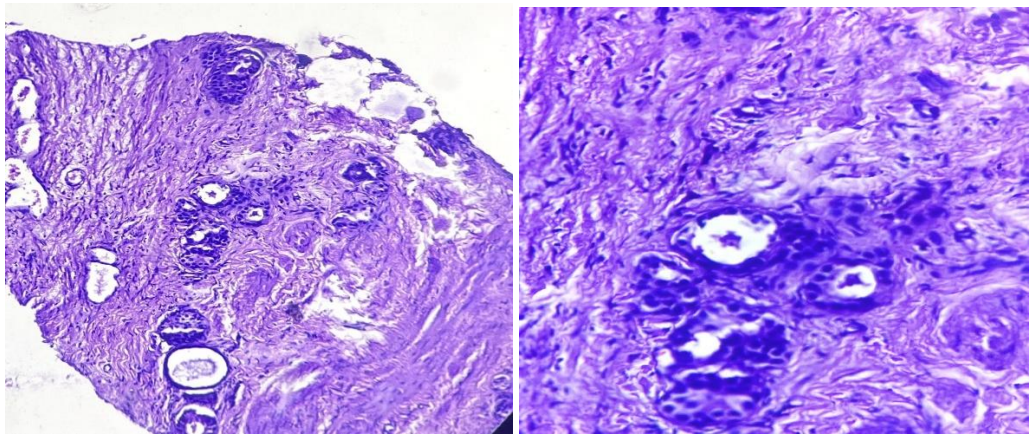
WHO Group	Grade	PSA LEVELS (ng/ml)			TOTAL
		>4-50	51-100	>100	
I		0 (0.0%)	0 (0%)	0 (0%)	0(0%)
II		04 (66.66%)	01(16.6%)	01 (16.6%)	06 (100.0%)
III		01(14.28%)	05 (71.4%)	01(14.28%)	07 (100.0%)
IV		0 (0.0%)	08 (88.88%)	01(11.11%)	09 (100.0%)
V		01 (12.5%)	02 (25.0%)	05 (62.5%)	08 (100.0%)
TOTAL		06(20.0%)	16 (53.33%)	08 (26.66%)	30(100.0%)

Predominantly well-formed glands with a lesser component of poorly-formed (Grade 2)



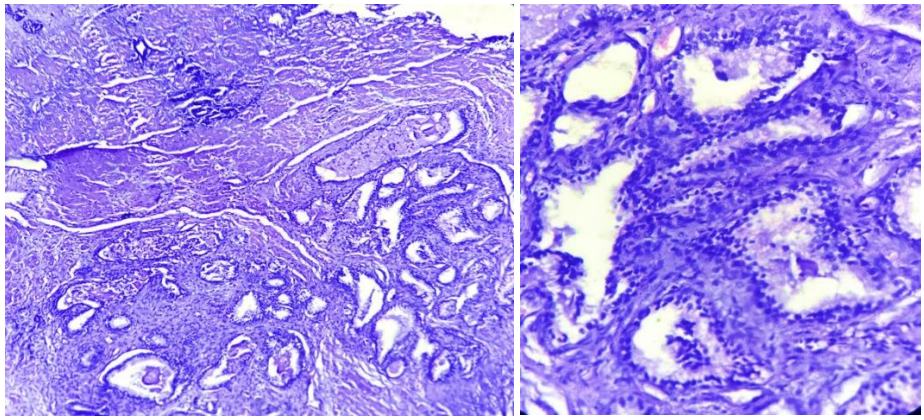
10x view **40x view**

Predominantly poorly-formed/fused glands with lesser component of well-formed glands (Grade 3)



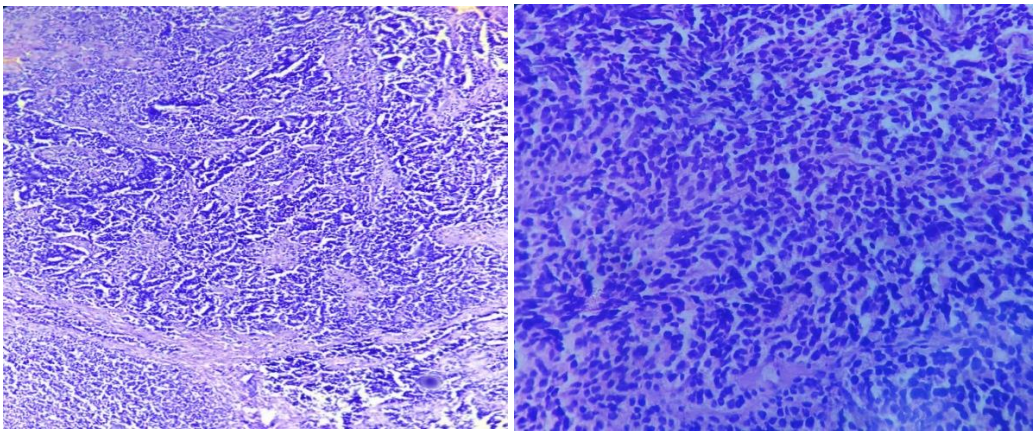
10x view **40x view**

Poorly formed/ cribrifom pattern adenocarcinoma (grade 4)



10x view **40x view**

Lack of gland formation (or with necrosis) with or without poorly-formed/fused/cribriform glands (Grade 5)



10x view **40x view**

DISCUSSION :

Carcinoma of prostate is common cancer in India because of increasing life expectancy and relatively better diagnostic method. The gold standard triad for diagnosing prostate cancer comprised DRE, PSA level, and transrectal ultrasonography. PSA level is one of the most important, accurate early clinical marker to assess the individual risk of prostate cancer. PSA values correlated significantly with Gleason's score/grade of prostatic carcinoma.The most common presenting age group is 66-71 years with a mean age of 68.5 years.

The majority of the cases are diagnosed when the tumour has extended beyond the confines of the gland, making it incurable [13]. Eighty percent of the patients in our study presented with a poor stream, frequency, nocturia and postvoid dribbling. Five presented with hematuria, and three patients with acute urinary retention. Obstructive LUTS in prostatomegaly is due

to compression of the prostatic urethra. Aslamet al [14] and Raza et al [15] also found LUTS as the most common presenting symptom correlated with our study.

Most literature reflects a positive correlation between rising PSA and increasing Gleason score[1][3][4][5][6]. In Cameroon, Elame et al. noted a moderate correlation between initial PSA and Gleason scores. Lojanapiwat et al. and Okolo et al., supporting the positive association across different populations[17]. In Shu CP, et. al. also found a positive correlation between initial PSA and Gleason scores[16].Recent studies report statistically significant correlations , suggesting that higher PSA is associated with poorly differentiated, more aggressive tumors[1][3][5]. However, several publications note heterogeneity: Some studies found a weak or non-significant correlation when newer grade groupings are used[11][12]. Confounding factors such as prostatitis, benign prostatic hyperplasia, and age can elevate PSA independent of cancer grade[6][7]. PSA density (PSA/prostate volume) may offer even stronger correlation with Gleason score, enhancing predictive ability[4].

High-grade tumors (Gleason ≥8) generally show mean PSA levels much higher (e.g., >100ng/ml) compared to low-grade cancers[6][5]

CONCLUSION:

There is a substantial, generally positive correlation between serum PSA levels and Gleason scores, making these parameters valuable for risk stratification and prognosis in prostate cancer[1][3][5]. The relationship is strengthened when considering PSA density. Combined assessment can guide management decisions, but clinicians should account for confounders and variability noted in some populations[11][6][7]. Further research is warranted to refine prediction in diverse clinical scenario.

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