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KEY WORDS: Prostate cancer; Prostate-specific antigen; Gleason's grade group; Lower Urinary Tract Symptoms.

ANALYSIS OF THE CORRELATION BETWEEN PROSTATE SPECIFIC ANTIGEN AND GLEASON GRADE GROUP IN PATIENTS WITH PROSTATE CARCINOMA

Vinit Kumar Singh Post Graduate, Department of Urology, Yenepoya Medical College Hospital, Yenepoya Deemed to be University, Mangalore-575018, India

M Mujeebu Rahiman* Professor, Department of Urology, Yenepoya Medical College Hospital, Yenepoya Deemed to be University, Mangalore-575018, India *Corresponding Author

Altaf Khan Associate Professor, Department of Urology, Yenepoya Medical College Hospital, Yenepoya Deemed to be University, Mangalore-575018, India

Nischith D'Souza Associate Professor, Department of Urology, Yenepoya Medical College Hospital, Yenepoya Deemed to be University, Mangalore-575018, India

ABSTRACT

Prostate cancer (PCa) is the one of the most common cause of cancer death among men globally. Prostate-specific antigen (PSA) has been widely used as a screening for PCa. The aim of the study is to evaluate the correlation of serum PSA and Gleason grade group in diagnosis of PCa. Total 30 male patients with age >55 years with Lower urinary tract symptoms (LUTS) and serum total PSA >4ng/ml has been included in the study. All the patients have undergone transrectal ultrasound (TRUS)-guided prostate biopsy (PBx). The results showed that incidence of prostate cancer in our study was 26.58 % for PSA between 4 to ≤10 ; 41.86% patient were positive for adenocarcinoma in the range of PSA between >10 to ≤20. 88.89 % of patient diagnosed with Prostatic adenocarcinoma with serum total PSA >20. Histopathology report Gleason grade group and total serum PSA correlation was then calculated. Our study suggests that there is a high correlation between PSA and carcinoma differentiation grade determined by Gleason's system, as well as low correlation between PSA and tumor differentiation grade. In conclusion, a strong correlation was found between the total PSA level and tumor diagnosis, tumor aggressiveness. In real-life practice with serum total PSA testing, a greater chance of a positive cancer result, high-grade cancer, was found in patients with a higher PSA level.

INTRODUCTION

Prostate cancer (PCa) is the second most common cause of cancer in men and one of the leading cause of cancer death globally[1, 2]. The prevalence of PCa vary by more than 25 fold worldwide, the highest rates being in Australia/New Zealand, Western and Northern Europe, North America. The prevalence of PCa is also increasing in India [3,4].

Prostate Specific Antigen (PSA) level is commonly used for determining patients risk for prostate cancer [5]. Although the cut-off values of PSA may change between different centers the general approach is to biopsy patients with a minimum PSA level of 4 ng /ml. The most common subclassification of PSA groups was divided into 3 categories for cancer risk as low- risk PSA 4 - 10ng\ml, intermediate-risk 10 -20 ng\ml and high-risk >20 ng\ml [6]. The Gleason grading system is based on a study from 1959 - 1964 by the Veteran's Affairs Cooperative Research Group (VACURG) [7]. As most of the tumors typically had two histologic patterns, a score was created that added the two most common grade patterns in a tumor, with scores ranging from 2 to 10. The estimated age adjusted incidence rates (AARs) of prostate cancer in India as a whole was 3.7/105 persons during the year 2008.The mean age of patients with prostate cancer was 69.7 years[8]. The present study was conducted to evaluate the correlation of serum PSA and Gleason grade group in diagnosis of PCa in patients from South India.

MATERIALS AND METHODS

A Prospective study was conducted in a tertiary care hospital, Mangalore during June 2018 to January 2019.The study was approved by the Institutional Ethical Committee of Yenepoya Deemed to be University. Written informed consent was taken from all the patients. A total 30 patients were included after meeting the inclusion criteria. The inclusion criteria includes, the male patients presenting with Lower Urinary Tract Symptoms (LUTS), >50years, and raised PSA > 4 ng/Dl. The excliusion criteria includes patients having age <50 years, Serum PSA<4ng/dl, Post operative TURP, Open / minimal invasive Radical/ Simple Prostatectomy. The patients having any other invasive endourological procedures done with in past 6 weeks have excluded.

Digital rectal exams (DRE) have done for all the patients. All patients underwent TRUS guided 12 core biopsy by a experienced radiologist. All biopsy specimens were reported by an experienced pathologist & results were interpreted. A spring driven 18 gauze needle core biopsy device or biopsy gun which can be passed through the needle guide attached to the ultrasound probe is most often used. Most ultrasound units provides best evaluation of the biopsy needle path in the sagittal plane. Images are typically superimposed with a ruled puncture path that corresponds to the needle guide of the TRUS unit. The biopsy gun advances the needle 0.5 cm & samples the subsequent 1.5 cm of tissue with the tip extending 0.5 cm beyond the area sampled. Pressing the probe against the rectum also minimize the discomfort of the biopsy needle traversing the rectal mucosa. The biopsy sample is typically placed in 10 % formalin or as per local protocol.

Total serum PSA levels were correlated with HPE report (Gleason's grade). Patients were grouped according to Total PSA as low-risk (<10 ng/ml), medium-risk (10-20 ng/ml) and high-risk (>20 ng/ml). These groups were then compared for differences among histopathological features.

RESULTS AND DISCUSSION

Total 60 patients were screened and out of which 30 patients were included in this study. 19 patient presented with PSA range 4 to ≤10, 7 patient with PSA from >10 to ≤20 & 4 patient were having PSA >20. PSA level is one of the most widely used measurement for determining patients risky for prostate cancer. Although the cut-off values of PSA may change between different centers the general approach is to biopsy patients with a minimum PSA level of 4 ng/ml. In 30 patients 4 patients were Gleason's group 1, 6 under Gleason group 2, 5 under Gleason's group 3, 10 under Gleason's group 4 & 5 under Gleason's group 5. The most common sub classification of PSA groups were divided into 3 categories for cancer risk as low- risk, intermediate-risk and high-risk levels [9].

For total PSA range between 4 to ≤10 ; 26.58% patients was diagnosed with prostatic adenocarcinoma.41.86% patient were positive for adenocarcinoma in the range of PSA between >10 to ≤20. 88.89 % of patient diagnosed with Prostatic adenocarcinoma with serum total PSA >20 (Fig 1). There is significant association between HPE and PSA (p<0.001). In our study Prostatic adenocarcinoma mean age is 66.66 years & Mean PSA was 17.86 Ng/ml.

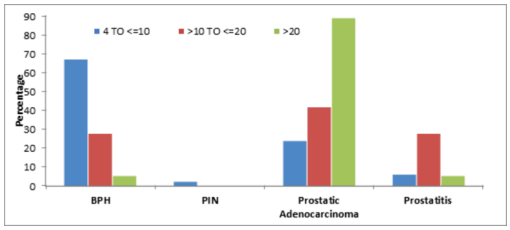

Fig 1: PSA range among various risk factor groups and its percentage

As area under the curve showed a significant (p<0.001), therefore we can say that there is evidence that, total PSA have an ability to distinguish between the HPE (Fig 2, Table 1).

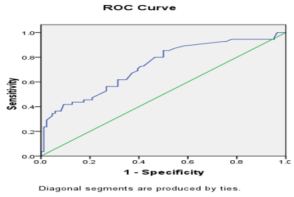

Fig 2: Area under the receiver operating characteristic curve

Table 1. Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+LR	95% CI	-LR	95% CI
4 to ≤10	61.82	47.7 - 74.6	65.12	54.1 - 75.1	1.77	1.2 - 2.5	0.59	0.4 - 0.8
10 to-≤20	41.82	28.7 - 55.9	89.53	81.1 - 95.1	4.00	2.0 - 8.0	0.65	0.5 - 0.8
>20	29.09	17.6 - 42.9	97.67	91.9 - 99.7	12.51	3.0 - 52.3	0.73	0.6 - 0.9

Gleason grading is the most commonly used grading system for prostate cancer which is revised by WHO in 2016. The revised system defines grade grouping from 1 to 5. This grade grouping is strongly correlated with prognosis similar with classical Gleason grading[6]

It is comparable with a study done by Bannakij Lojanapiwat, et al in article Correlation and diagnostic performance of the prostate-specific antigen level with the diagnosis, aggressiveness, and bone metastasis of prostate cancer in clinical practice showed that The specificity of a PSA level of 4.1–10, 10.1–20, 21.1–50, 50.1–100, and > 100 ng/ mL in the diagnosis prostate cancer was 9.3, 55.5, 87.5, 98.2, and 99.7, respectively [11]. PSA testing has been used in clinical practice since 1986 and has led to changes in screening and the early diagnosis of prostate cancer, which is followed by earlier treatment . Nowadays, the accepted tools for the diagnosis of prostate cancer are the Digital Rectal Examination and serum total PSA. The widespread use of PSA screening had led to an increase in overall survival. The strengths and weaknesses of PSA testing have also been reported. A limitation of PSA testing is the risk of over diagnosis and resultant negative biopsies owing to poor specificity. Many medical & surgical conditions can affect the PSA level; PSA is prostate-specific but is not prostate-cancer-specific.Conditions such as large benign prostatic hyperplasia, prostatitis, prostate manipulations, and recent ejaculation within 24 hours can results in elevations of the PSA level

CONCLUSION

In conclusion, total PSA level may not just show the risk category of the prostate cancer but also may be associated with some histopathological prognostic factors. These results have to be confirmed by wider studies with larger number of cases. In real-life practice with serum total PSA testing, a greater chance of a positive cancer result, high-grade cancer, was found in patients with a higher PSA level.

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