Original Article

Prostate specific antigen (PSA) as a predictor of biological behavior of prostate cancer

Durre Shohab, Athar Khawaja, Imran Jamil, Asadur Rehman, Saeed Akhter

Department of Urology and Kidney Transplant. Pakistan Kidney Institute, Shifa International Hospital, Islamabad, Pakistan

Objective: We evaluated PSA as a predictor of biological behavior of prostate cancer by comparing it with Gleason score.

Methodology: We retrospectively studied 105 prostate cancer patients with mean age of 69.61years (range=53-90).Seventy-four patients had Gleason score of ?7 (70.5%) while 31 had Gleason of >7 (29.5%). Fifty patients had PSA between0.1-20ng/ml (47.6%), 25 had between 20.1-50ng/ml (23.8%) while 30 had >50ng/ml (28.6%).

Results: Median PSA in patients with Gleason ?7 group was 18.46ng/mlcompared to 61.60ng/ml in Gleason >7group.54% patient in Gleason ?7 group had PSA between 0.1-20, 28.4% had between 20.1-50, 17.6% had>50 compared to 32.3%,12.9% and 54.8%, respectively in Gleason >7 group.

Conclusion: High PSA is directly associated with high Gleason score and can be used to predict the presence of high grade prostate cancer. (Rawal Med J 2014;39: 425-427).

Key words: Prostate specific antigen (PSA), prostate cancer, Gleason score.

INTRODUCTION

Prostate cancer is the most commonly occurring genitourinary cancer in men and is second most common cause of cancer related deaths in men.[1] The incidence of prostate cancer varies widely among different parts of the globe with <5 per 100,000 cases in India, Egypt, China and Bangladesh, to greater than 100 per 100,000 in the US and New Zealand.[2] Prostate specific antigen (PSA) has well established role in its diagnosis and follow-up and is widely used as a screening tool. Studies have shown a direct relationship between PSA and tumor volume including presence of bone metastasis.[1]The Gleason score is the most widely utilized histological grading system for prostate cancer and a powerful predictor of aggressive cancer behavior.[3] Whether PSA is a marker only for disease volume or it is also an indicator of disease aggressiveness is not clear yet. The aim of this study was to compare the PSA with Gleason score to evaluate the role of PSA to predict aggressiveness of disease.

METHODOLOGY

This cross sectional observational study was conducted from March 2003 to December 2011,after approval from Institutional Review Board.105 histologically proven prostate cancer patients were retrospectively reviewed. All prostate biopsies were done under Trans Rectal Ultrasound Guidance (TRUS). The data about patient's age, PSA and Gleason score on biopsy was collected. Patients with metastatic skeletal lesions on bone scan were excluded from study. Patients were divided into two groups; those with Gleason score less than or equal to seven were labeled group A, while those with Gleason score more than seven were labeled as group B. With respect to PSA, the patients in both groups were sub divided as having PSA 0.1-20.0ng/ml, 20.1-50.0ng/ml and more than 50.0 ng/ml. Percentage of PSA sub groups was calculated in both group A and B. SPSS Ver16 was used to analyze the data

RESULTS

Out of 105 patients,74(70.5%) had Gleason score of <7, while 34 (29.5%) had Gleason of >7.The mean age of patients was 69.61years (range 53-90). Fifty patients (47.6%) had PSA from 0.1 to 20ng/ml25 (Table 1).

Table 1. Patient distribution with respect to PSA.

PSA (ng/ml)	Number	Percentage
1-20	50	47.6
20.1-50	25	23.8
>50	30	28.6

51.3% patient in Gleason <7 group had PSA between 0.1-20,27.0% had PSA between 20.1-50,17.6% had PSA >50 compared to 35.4%,12.9% and 61.2% respectively in Gleason >7 group (p=0.0004) (Table 2).

Table 2. Comparison of PSA with respect Gleason score.

Gleason score	Median PSA ng/ml	P value
≤7	18.46	0.0001
> 7	61.60	

Table 3. Median PSA in two Gleason groups.

PSA (ng/ml)	Gleason ≤ 7	Gleason >7	P value
0.1 – 20	38/74 (51.3%)	11/31 (35.4%)	0.0004
20.1 – 50	20/74 (27.0%)	04/31 (2.9%)	
> 50	13/74 (17.6%)	19 /31 (61.2%)	

Median PSA in patients with Gleason <7 group was 18.46ng/ml compared to 61.60ng/ml in Gleason >7group (p =0.0001) (Table 3).

DISCUSSION

Spectrum of prostate cancer ranges from slow-growing indolent tumors to rapidly progressing fatal carcinomas associated with significant morbidity.[4] PSA is an accepted screening tool since early nineties and lead to considerable decrease in prostate cancer related deaths rates in America and Europe.[5] However, now its screening efficacy is being questioned because of high risk of over diagnosis.[6] PSA has also a well established role in follow up of prostate cancer after any kind of treatment modality used.

PSA has also been used for predicting disease prognosis by indicating disease burden including metastasis. Its level correlates well with the presence of bone metastasis especially, in western people.[7]As shown in one study, the PSA value less than 10 is associated low risk of having bone metastss is.[7] Miller et alreported positive correlation between presence of bone metastasis and PSA>20.[8]

PSA concentration can also be used to predict the long term risk of metastasis or death from prostate cancer.[9] Based on all these findings, PSA level at diagnosis became the component of the standard risk stratification factors and is now a component of most of the clinical nomograms.[10]

PSA is routinely performed as part of prostate cancer screening in some setups while in other it is performed as part routine urological investigation in patients older than 40 years presenting in urology clinics with lower urinary tract symptoms. However, whether the level of PSA at presentation indicates only the presence of prostate cancer and can give a hint about disease burden including metastasis or it is also an indicator of presence of a high grade aggressive tumor with high Gleason score?[11] We have tried to answer the question by comparing the PSA with Gleason score, a well established marker of disease malignant potential in prostate cancer patients with no evidence of skeletal metastasis.

There was significantly high PSA (61.60 VS 18.41ng/ml)level in patients with Gleason>7 compared to those having Gleason<7 (p=0.0001). Also, 61.2% patients in Gleason>7 group had PSA >50ng/ml compared to 17.6% in other group. Similarly, 35.4% patients in Gleason>7 group had PSA from 0.1 to 20.0 ng/ml compared to 51.3% in group Gleason <7 (p=0.0004). This has been shown in previous studies.[12]Following limitations of the study need to be highlighted. PSA has correlation with volume of disease and we did not look at that possibility. We compared metastatic vs non metastatic PSA, however, even non metastatic is a wide spectrum of disease.

CONCLUSION

These findings indicate that high PSA at diagnosis not only indicate high disease burden can also be used to preempt presence of an aggressive prostate cancer with high Gleason score. In addition, PSA can also used as biological marker to preempt the aggressiveness of prostate cancer.

Author Contribution:
Conception and design: DurreShohab
Collection and assembly of data:Athar, Asad
Analysis and interpretation of the data: DurreShohab
Drafting of the article: DurreShohab
Critical revision of the article for important intellectual content: Athar, Imran
Statistical expertise: DurreShohab
Final approval and guarantor of the articleSaeed Akhter
Corresponding author email: Dr. DurreShohab:
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