Study of Serum Prostate Specific Antigen (PSA) Levels in Patients of Benign Enlargement of Prostate and Prostatic Cancer

Dhananjay Vasantrao Bhale

Professor and Head, Department of Biochemistry, MGM'S Medical College, Aurangabad, Maharashtra, INDIA.

Corresponding Address:

dr.bhale@gmail.com

Research Article

Abstract: Prostate specific antigen (PSA), neutral serine protease secreted exclusively by prostatic epithelial cells, has a number of applications in the management of men with prostatic carcinoma. While it is widely recognized that elevated PSA correlates with the presence of carcinoma, little data exist regarding the use of PSA as the initial test in the early detection of prostatic cancer Prostate-specific antigen (PSA) is a protein produced by the prostate and this protein may be elevated for several reasons, including prostatitis, benign prostatic hypertrophy and cancer. The value of the PSA test varies when used for screening, diagnosis, prognosis and as indicator of recurrence of prostate cancer. AIMS and **Objectives:** To study levels of Serum PSA in patients of Benign prostatic hypertrophy and prostatic carcinoma and comparing them with normal healthy individuals above 55 years of age. **Material and Methods:** The study was performed on 100 consecutive male patients (mean age 68 ± 10.8 years SD) comprising of 80 patients with benign disease (80%) and 20 prostate carcinoma patients (20%), who had histologically proven prostate cancer. Patients with total PSA between 2-25 ng/ml were included in the study. 30 normal healthy males with age 55 ± 10 years, served as control. Serum total PSA were analyzed using CLIA method.The mean total PSA in normal healthy control subjects was 1.72 ± 1.06 ng/ml. It was increased significantly in diseased condition. Its mean concentration in carcinoma patients was 12.6 ± 5.3 ng/ml and in benign patients it was 6.3 ± 4.6 ng/ml. **Conclusions**: Markedly increased PSA levels in serum suggests a cancer. This information may aid patients and clinicians in management of prostate cancer, such as selecting patients for watchful waiting. However, more research is needed to determine the performance characteristics of PSA in clinical practice. It is recommended that the use of PSA and Digital Rectal Examination in combination is important as a diagnostic procedure for the early detection of prostate cancer.

Key words: Prostate specific antigen (PSA), prostatitis, benign prostatic hypertrophy and cancer.

Introduction

The discovery and the use of serum prostate specific antigen (PSA) have considerably improved the diagnosis of prostate cancer during the past 20 years. Before PSA era, early diagnosis was only based on the digital rectal examination (DRE) of which the Limitations have been evidenced; over half of the tumours diagnosed by such means had already spread out of the prostate and were incurable. Assessment of serum PSA has allowed the diagnosis to be made at an earlier stage of the disease, curable by current treatments. Whichever the diagnostic tools, transrectal ultrasound (TRUS) prostatic biopsies remain necessary for diagnosis ascertainment, taking into account the low specificity of PSA assessment. The feasibility of a diagnosis at an early and curable stage of the disease has logically resulted in screening procedures aimed at reducing the high mortality related to prostate cancer (1)) Prostate specific antigen (PSA), neutral serine protease secreted exclusively by prostatic epithelial cells, has a number of applications in the management of men with prostatic carcinoma. While it is widely recognized that elevated PSA correlates with the presence of carcinoma, little data exist regarding the use of PSA as the initial test in the early detection of prostatic cancer Prostate-specific antigen (PSA) is a protein produced by the prostate and this protein may be elevated for several reasons, including prostatitis, benign prostatic hypertrophy and cancer. The value of the PSA test varies when used for screening, diagnosis, prognosis and as indicator of recurrence of prostate cancer(2).

Aims and Objectives

To study levels of Serum PSA in patients of benign prostatic hypertophy and prostatic carcinoma and comparing them with normal healthy individuals above 55 years of age.

Material and Methods

The study was performed in Department of Biochemistry ,MGM'S Medical College, Aurangabad.Total 100 consecutive patients with Benign enlargement of prostate and histologically diagnosed carcinoma of prostate having age group 55 to 70 years were taken as study group and Patients with total PSA between 2-25 ng/ml were included in the study. 30 normal healthy males with age 55 -70 years, served as control. Serum total PSA were analyzed using CLIA method. The mean total PSA in normal healthy control subjects was 1.72 ± 1.06 ng/ml. It was increased significantly in diseased

condition. Its mean concentration in carcinoma patients was 12.6 ± 5.3 ng/ml and in benign patients it was 6.3 ± 4.6 ng/ml. Mean age was 68 ± 10.8 years SD. Out of 100 patients 80 patients were with benign disease (80%) and 20 with prostate carcinoma patients (20%), who had histologically proven prostate cancer. Patients with total PSA between 2-25 ng/ml were included in the study.

Results

Table 1: Distribution of total number of cases in study group

Benign enlargement of prostate	80	80 %
carcinoma of prostate	20	20%

Table 2: Age Distribution in case and control group

Group	Mean age in SD
Study group	68 ± 10.8 years
Control	55 ± 10 years,

Table 3: Serum Prostate specific antigen levels in study group and control group.(ng/ml)

Group	Mean±SD
Benign enlargement of prostate	6.3 ± 4.6 ng/ml
carcinoma of prostate	12.6 ± 5.3 ng/ml
Control	1.72 ± 1.06 ng/ml

Discussion

Prostate cancer among adult males is the most common neoplasm in western countries. Prostate specific antigen (PSA) is now a well established tumor marker that aids in the early detection of localized prostate cancer. Increased PSA concentrations are found in the serum of patients with benign prostatic hyperplasia or patients with prostate cancer, respectively. Therefore, in general the specificity of this test is low. The diagnostic value of PSA can be improved in consideration of clinical data, patients age, the measurement of free or complexed PSA, and the measurement of PSA velocity, respectively(.8) The use of prostate-specific-antigen in the early detection of prostatic carcinoma combined with digital-rectal examination results in a 2-3 times increase in prostatic carcinoma detection rate. 2/3 of PSA detected prostatic carcinoma are organ confined vs 40% of those which are detected by digital-rectal examination. 15-35% of all operated localized prostatic carcinoma have a normal PSA. A biopsy is indicated in men with a life expectancy of more than 10 years when the PSA value is above 10 ng/ml and/or digital-rectal examination is suspicious. This concerns only 2% of all men at the age older than 50 years. In 90% of all men older than 50 years the PSA is normal as well as the digital-rectal examination. In 4% of these the result of PSA and digital-rectal examination is false negative that means 4% have prostatic carcinoma. However, repeated digital-rectal examination and PSA determination on a yearly basis detects most of these overlooked prostatic carcinoma which still are organ confined in about 90% of the cases. In men with a minimal elevated PSA-value of 4-10 ng/ml, 25% will have a prostatic carcinoma regardless of the finding on digital-rectal examination. The indication to do a biopsy can be specified by the use of age specific PSA cut-off-levels and most likely in future by determining the free PSA vs the complex-bound PSA. Controversy exists about the usefulness of PSA-density and PSA-velocity.(3) In patients with elevated PSA or abnormal DRE prostate biopsies are recommended. However, the routine use of PSA to detect early prostate cancer is limited due to the PSA elevation in patients with prostatic hyperplasia. Possibilities to distinguish BPH from prostate cancer among men who have minimal PSA elevation (4.0 to 10.0 ng/ml) are the use of PSA velocity, PSA density, age adjusted PSA, and analysis of free and complexed PSA. Screening programs for prostate cancer will increase the percentage of localized prostate cancer, which can be cured by radical prostatectomy.(4) P.S.A used as prescreening and followed by DRE and TRUS when PSA is abnormal is highly efficient in detecting prostate cancer at a localized (potentially curable) stage since 99% of the cancers diagnosed were at such a localized stage, thus practically eliminating the diagnosis of metastatic and noncurable prostate cancer(5). The optimal tumor marker for prostate cancer would be effective for early detection, staging, and monitoring patients after definitive treatment. This marker would have a high sensitivity, specificity, and positive predictive value for distinguishing men with benign prostatic hyperplasia (BPH) from men with early prostate cancer. Such a marker would consistently detect biologically significant disease, correlate with clinical and pathologic staging, and predict prognosis. In addition, this marker would be accurate at indicating cure or progression of disease after treatment. Certainly, the ideal marker also would be reproducible, inexpensive, generate results rapidly, be easy to perform, be accessible to clinicians, and tolerable to patients. Unfortunately, such a "super" marker does not exist at this time. However, prostate-specific antigen (PSA) has many of the aforementioned capabilities. This article will describe the current utility of PSA in the diagnosis and staging of prostate cancer.(6)The study was performed on 100 consecutive male patients (mean age 68 ± 10.8 years SD) comprising of 80 patients with benign disease (80%) and 20 prostate carcinoma patients (20%), who had histologically proven prostate cancer. Patients with total PSA between 2-25 ng/ml were included in the study. 30 normal healthy males with age 55 ± 10 years, served as control.(Table No.1 and2). Serum total PSA were analyzed using Chemiluminescence immunoassay method. The mean total PSA in normal healthy control subjects was 1.72 ± 1.06 ng/ml. It was increased significantly in diseased

condition. Its mean concentration in carcinoma patients was 12.6 ± 5.3 ng/ml and in benign patients it was 6.3 ± 4.6 ng/ml.(Table no.3)Our results match with studies ofBrawer MK, et al2, Hammerer P,3,4. Heyns CF,etal,7, Changgeng Yi Xue Za Zhi. 9, Saito Y. Nihon Rinsho. 10

Conclusions

Markedly increased PSA levels in serum were seen suggesting a cancer. This information may aid patients and clinicians in management of prostate cancer, such as selecting patients for watchful waiting. However, more research is needed to determine the performance characteristics of PSA in clinical practice. It are recommended that the use of PSA and Digital Rectal Examination in combination is important as a diagnostic procedure for the early detection of prostate cancer. The efficacy of this or any other early detection test to decrease prostate cancer mortality necessitates the results of prospectively randomized clinical trials.

References

1. Fournier G, Valeri A, Mangin P, Cussenot O., Prostate cancer: Diagnosis and staging. Prostate Cancer Prostatic Dis. 2006;9(1):6-13.
2. Brawer MK, Chetner MP, Beatie J, Buchner DM, Vessella RL, Lange PH., Screening for prostatic carcinoma with prostate specific antigen. [J Urol. 1992] Screening for prostatic carcinoma with prostate specific antigen.
3. Hammerer P, Huland H. Urologe A., Value of determining prostate-specific antigen for early detection or prostatic carcinoma. 1995 Jul;34(4):283-9.
4. Hammerer P, Huland H., Status of PSA determination for early detection of prostate carcinoma S Afr Med J. 2001 Aug;91(8):679-84.
5. Candas B, Cusan L, Gomez JL, Diamond P, Suburu RE, Lévesque J, Brousseau G, Bélanger A, Labrie F., Evaluation of prostatic specific antigen and digital rectal examination as screening tests for prostate cancer. PMID: Ann Urol (Paris). 2004 Oct;38(5):207-24.
6. Lee CT, Oesterling JE, Diagnostic markers of prostate cancer: utility of prostate-specific antigen in diagnosis and staging. Semin Surg Oncol. 1995 Jan-Feb;11(1):23-35. S Afr Med J. 2001 Aug;91(8):679-84.
7. Heyns CF, Naudé AM, Visser AJ, Marais DC, Stopforth HB, Nyarko JK, Stellmacher GA, Early diagnosis of prostate cancer in the Western Cape. Pathologe. 2005 Nov;26(6):469-72.
8. Significance of the PSA-concentration for the detection of prostate cancer.
9. Changgeng Yi Xue Za Zhi., Diagnosis of prostate cancer: comparison of serum prostate specific antigen, digital rectal examination and transrectal ultrasonography. 1997 Mar;20(1):23-8.
10. Saito Y. Nihon Rinsho. The usefulness of prostate-specific antigen assay for the early detection and follow up of the prostate cancer, 1998 Aug;56(8):1989-93.