PROSTATE-SPECIFIC ANTIGEN (PSA), A BIOMARKER OF NEOPLASTIC PROSTATIC DISEASE

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Abstract: Prostate- specific antigen (PSA) is a 33 KDa serine protease produced by both normal and neoplastic prostate epithelial cells. The use of PSA as serum biomarker greatly increased the chance to detect prostate cancer at an early and still curable stage . In our   study; we want to show that there is a correlation between: patients' age (> 50 years old); PSA levels; and the increased incidence of prostate cancer . For our study; we enrolled   253 patients; age 50 to 80 years old; serum PSA levels > 4ng/ml; and no lower urinary tract symptoms. From the 253 patients; 168 patients were age 60 to 80 years old (lot A) and 85 patients were age 50 to 60 years old (lot B). From lot A   24 patients (14;28%) had serum PSA levels > 4ng/ml and 18 of them (10;71%) were diagnosed histologically with adenocarcinoma of the prostate . In lot B; 4 patients had serum PSA level> 4ng/ml and only one was   diagnosed with adenocarcinoma of the prostate. The incidence of prostate cancer was higher in lot A (10;7%) in comparison with patients 50 to 60 years old (1;17%). The predictive value of PSA in the diagnosis of prostate cancer is 25 % for patients age 60 to 80 years old.

INTRODUCTION:

Prostate cancer is one of the most frequent malignant diseases; especially in men of advanced age and its incidence has been continuously increasing. The advent of prostate-specific antigen (PSA) has evolved in detection of prostate cancer (PCa). It is well known that serum PSA levels are influenced by certain endogenous factors; including : benign prostatic hyperplasia;   prostatitis and ischemia ; as well as exogenous factors ; such as : urethral instrumentation and digital rectal examination. Serum PSA occurs in multiple molecular forms; including unbound free form and complexed forms bound to α1- antichymotrypsin (PSA-ACT) ; α2-macroglobulin; protein C inhibitor; α1- antitrypsin and inter-α- trypsin inhibitor. High serum PSA levels (PSA > 10 ng/ml) have been associated with a diagnosis of prostate cancer. Lower   PSA values(4-10ng/ml) ; are associated with lower rates of positive prostatic biopsy. PSA testing is associated with an average lead time of 5-6 years for prostate cancer detection when a PSA level of 4;0 ng/ml is used as a threshold for biopsy.

Lower PSA levels of 3;5-4;0 ng/ml for men 50-70 years old; and 2;0-2;5 ng/ml for men 40-50 years old ; are generally considered abnormal. PSA levels increase with age ; in clinical practice a PSA level of 4 ng/ml in the blood may be used ; often when there are two consecutive rises in PSA level ; as a threshold for further diagnostic studies (e.g: prostatic biopsy). PSA levels of 4-10 ng/ml also occur in men with BPH; and prostate cancer is present in only 25% of patients with PSA levels in this range. To enhance the PSA performance; a

number of different strategies have been developed .These include use of PSA density; PSA velocity and the use of the molecular forms of PSA (free and bound).

A) *PSA density* : considers the relationship of the PSA level to the size of prostate. An elevated PSA might not arouse suspicion in a patient with a pre-existing enlarged prostate.

B) *PSA velocity :* is the change in PSA level over time. A steep rise in PSA level increases the likelihood of malignant prostate cancer.

C) *Free versus bound PSA* : Circulating PSA in the serum has been identified in two forms: free PSA or PSA bound to protein. The ratio of free to bound PSA decreases from benign to cancer. There is more free PSA in benign conditions whilst more bound PSA in cancer. In addition to its use in early detection of prostate cancer; PSA has been used in predicting the extent of identified cancer; guiding the selection of further diagnostic studies; predicting the response to treatment or; early detection of recurrences.
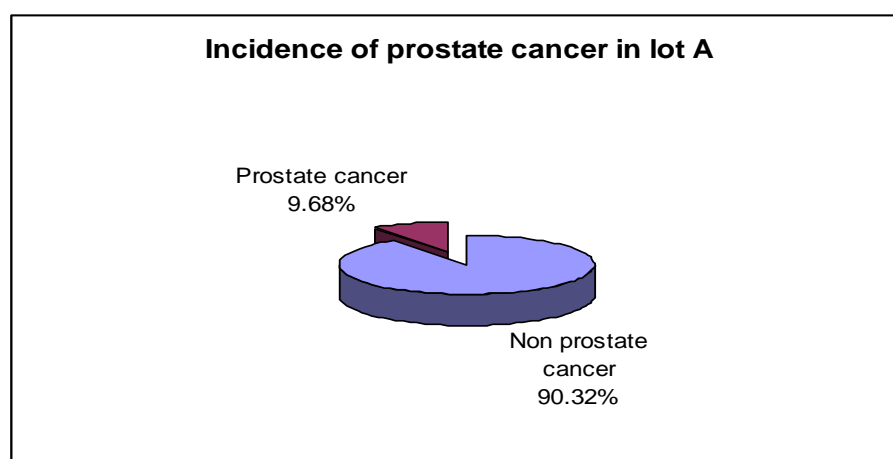
In our study we want to show that there is a correlation between: patients' age (> 50 years old); PSA levels and the increased incidence of prostate cancer.
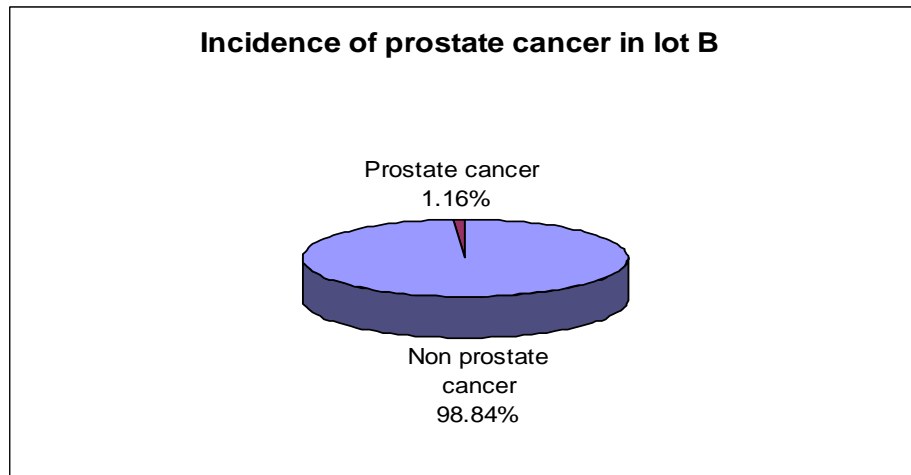
MATERIALS AND METHODS

Analyses were conducted on patients with PSA values greater than 4 ng/ml. The population study measured 253 patients; divided in two subgroups; A and B; which enrolled 168 and 85 patients with ages between 60-80 years (A group) and 50 to 60 years (B group). All the recruited subjects did not accused lower urinary tract symptoms (LUTS). We determined the PSA levels using the enzyme-linked immunosorbent assay (ELISA).

RESULTS

To find out that the difference observed between the two groups are statistically significant a χ squared test follow by a Fisher exact test were performed and the conclusion was that indeed the differences are statistically significant as the p-value was p=0.011. Regarding the relative risk of the age in determining the occurrence of prostate cancer the value obtained was RR=7.589 with a 95% Confidence Interval: 1.019 to 56.520; which implies that the age over 60 represent a risk factor for prostate cancer.

Incidence of prostate cancer in lot A

Prostate cancer
9.68%

Non prostate cancer
90.32%

Incidence of prostate cancer in lot B

Prostate cancer
1.16%

Non prostate
cancer
98.84%

24   patients from lot A (14; 28 %) had the PSA values > 4 ng/ml and in 18 of them (3;57 %) the biopsy result gave the diagnostic of prostate cancer. From lot B; 4 patients with PSA values > 4 ng/ml had the biopsy result   of   prostate cancer. The incidence of prostate cancer is higher in patients from lot A (3;57 %) in comparison with patients 50 to 60 years old. The predictive value of PSA in the diagnostic of prostate cancer is (25 %) for patients age 60 to 80 years old.

CONCLUSIONS:

In our study we have presented that ; patients higher than 60 years old; with the PSA values > 4 ng/ml present a higher incidence of the apparition of prostate cancer in comparison with patients age 50-60 years old.

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