

STUDY OF THE IMPORTANCE OF PROSTATE-SPECIFIC ANTIGEN DENSITY (PSA DENSITY) AS A PREDICTIVE INDICATOR FOR THE PRESENCE OF PROSTATE CANCER IN PATIENTS WITH T PSA (4-20) NG/ML

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ABSTRACT

Background: Prostate-specific antigen (PSA) and the digital rectal exam (DRE) have moderate sensitivity but low specificity for cancer diagnosis, potentially causing unnecessary treatment complications with prostate biopsy. Transrectal ultrasound (TRUS) to evaluate prostate size and calculate PSA density can improve the specificity of PSA in predicting cancer. We evaluated the sensitivity and specificity of different pre-biopsy tests to detect prostate cancer. **Objective:** Study of the prognostic value of PSA density in predicting the outcome of prostate biopsy in patients with T PSA (4-20) ng/mL from Lattakia University Hospital visitors between 2022-2023. **Methods and materials:** The research sample included 97 patients from the urology clinic and department at Lattakia University Hospital during the period between 2022-2023. Each patient was studied by taking a clinical history, clinical examination, radiology and laboratory, recording findings of prostate volume, digital rectal examination, total PSA value, PSA density calculation, and performing prostate biopsy for patients who met the inclusion and exclusion criteria; a special form was organized that included the clinical history, clinical examination, laboratory results and pathological report. Taking into consideration the withdrawal of blood samples before performing DRE. **Results:** The research sample included 97 patients from Lattakia University Hospital with TPSA value (4-20ng/mL) and age more than 50 years or age more than 45 years with a first-degree relative diagnosed with prostate cancer or age more than 40 years with two first-degree relatives diagnosed with prostate cancer and who met the inclusion criteria in the research. The patients' ages ranged from 52 to 80 years with an average of 66.22±7.8 years. **Conclusion:** PSA density is recommended as an adjunct to T PSA to predict the presence of prostate cancer and thus avoid unnecessary biopsies and potential complications in patients with PSA values within the range of 4-20 ng/ml, with a cut-off point of 0.15 being highly accurate in diagnosis.

KEYWORDS: PSA, PSA Density, Prostate Cancer.

INTRODUCTION

Prostate cancer is currently one of the most important medical problems facing men, with approximately 2.6 million new cases diagnosed each year in the European Union, accounting for approximately 11% of all cancers there. Serum PSA measurement is useful in identifying prostate cancer, monitoring response to treatment and detecting recurrence early.

Prostate-specific antigen (PSA) is a glycoprotein produced by normal and malignant prostate epithelium. It is found in the blood in two forms: bound and unbound (free form). Their sum constitutes the total PSA value. Its normal value in serum is less than 4 ng/ml and increases in prostate diseases. It is not specific for prostate cancer, and is affected by other factors such as benign prostatic

hyperplasia (BPH), prostatitis, and other benign factors.^[7]

In general, prostate cancer represents 31.5% of all male cancers and 9% of the causes of cancer deaths in men.^[1] Prostate cancer is the second most common cause of cancer-related death in men after bronchial cancer, and prostate-specific antigen (PSA), which is produced by all prostate tissue, is one of the most important markers for diagnosing prostate cancer.

METHODS AND MATERIALS

The research sample included 97 patients from the urology clinic and department at Lattakia University Hospital during the period between 2022-2023 AD.

Each patient was studied by taking a clinical history, clinical, radiological and laboratory examination, recording findings of prostate size, digital rectal examination, total PSA value, calculating PSA density, and performing a prostate biopsy for patients who met the inclusion and exclusion criteria; A special form was organized that included the clinical history, clinical examination, laboratory results, and pathological autopsy report. Taking into account the withdrawal of blood samples before performing DRE.

RESULTS

The research sample included 97 patients from Lattakia University Hospital with TPSA values (4-20ng/ML) and aged over 50 years or over 45 years with a first-degree

relative diagnosed with prostate cancer or over 40 years with two first-degree relatives diagnosed with prostate cancer and who met the inclusion criteria. The patients' ages ranged from 52 to 80 years with an average of 66.22 ± 7.8 years. We note that 58.8% of the studied research sample were within the age group of 60-70 years and 25.7% were in the age group of 70-80 years.

Also, 67.1% of the studied research sample had T PSA values in the range of 4-10 NG/ML and 32.9% in the range of 10.1-20 NG/ML. We note that 46.4% of the research sample had a prostate size of less than 50, 37.1% had a size of 50-75 and 16.5% had a size of more than 75. We note that 13.4% of the studied research sample had prostate cancer.

Table (1): Distribution of a sample of 97 patients according to age groups.

Age group	Number	%
50 – 60	15	15.5%
60 – 70	57	58.8%
70 - 80	25	25.7%
Total	97	100%

Table (2): Distribution of a sample of 97 patients according to T PSA values.

T PSA	Number	%
4 - 10	65	67.1%
10.1 - 20	32	32.9%
Total	97	100%

Table (3): Distribution of a sample of 97 patients according to prostate volume.

Prostate volume	Number	%
<50	45	46.4%
50 – 75	36	37.1%
>75	16	16.5%
Total	97	100%

Table (4): Distribution of a sample of 97 patients according to biopsy results.

Biopsy result	Number	%
Prostate cancer	13	13.4%
BPH	69	71.1%
chronic prostatitis	15	15.5%
Total	97	100%

Table (5): Average values of prostate-specific antigen density according to age groups, sample of 97 patients.

Age group	Mean \pm SD	Min - Max	P-value
50 – 60	0.11 \pm 0.07	0.06 – 0.26	0.07
60 – 70	0.12 \pm 0.09	0.09 – 0.30	
70 -80	0.14 \pm 0.05	0.11 – 0.39	

We note from the previous table that there are no statistically significant differences regarding the average

values of prostate-specific antigen density according to age groups.

Table (6): Mean values of prostate-specific antigen density according to the presence of prostate cancer in a sample of 97 patients.

Biopsy result	Mean \pm SD	Min - Max	P-value
Prostate cancer	0.17 \pm 0.09	0.14– 0.39	0.0001
Benign	0.10 \pm 0.04	0.06 – 0.19	

We note from the previous table that there are statistically significant differences in the average values of prostate-specific antigen density according to the

biopsy result, which were higher in cases of prostate cancer.

Table (7): Sensitivity and specificity of prostate-specific antigen density in predicting prostate cancer.

Psa D	Biopsy result		Total
	Positive	Negative	
>0.15	11	20	31
<0.15	2	64	66
Total	13	84	97
		Sensitivity	84.61% [69-92]
		Specificity	76.16% [69-82]
		PPV	35.48% [29-42]
		NPV	96.96% [82-100]
		Accuracy	77.31% [62-89]

DISCUSSION

Prostate cancer was identified in 13 cases of the study sample (13.4%). No statistically significant differences were observed regarding the mean value of PSAD according to age, $P: 0.07$.

The mean value of PSAD was statistically significantly higher in prostate cancer patients (0.17) versus 0.10 in the control group ($P: 0.0001$). The cut-off point of 0.15 for PSAD gave the best sensitivity (84%) and the best specificity (76%) in addition to the ability to exclude the presence of prostate cancer in 96% of the studied cases with an accuracy of 77%. The above findings can be explained as follows:

PSA is normally produced by benign and malignant prostate cells with small amounts of it being released into the circulation. Elevated PSA values usually occur as a result of disturbance of the normal glandular structure of the prostate that allows larger amounts to be released into the circulation; cancer cells lack the basal layer that limits the passage out of the cells. PSA elevation is not specific to cancer as it can be observed in many cases. In order to enhance its ability to identify cancer, other indicators have been added such as PSAD which has higher diagnostic values compared to TPSA alone. Studies have shown that prostate size in cancer patients is smaller compared to benign hyperplasia with larger amounts of PSA being produced and thus PSAD values are higher.

CONCLUSION

The present study in a cohort of patients undergoing prostate biopsy with PSAD calibration for the prediction of prostate cancer showed the following:

Prostate cancer was identified in 13% of patients. Mean PSA density values were statistically significantly higher in patients with prostate cancer than in benign enlargement. A cutoff of 0.15 gave a sensitivity of 84%, a specificity of 76%, a negative predictive value of 96%, and an accuracy of 77%.

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