

# Estimation of Prostate Specific Antigen (PSA) Concentrations in Patients with Prostatitis by Fully Automated ELISA Technique

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**Abstract:** Only prostatic epithelial cells secrete prostate-specific antigen (PSA), therefore men with prostatic diseases, including cancer, have higher serum concentrations of PSA. We assessed its value in prostate cancer detection and staging. These studies aim to determine the PSA value and relation with body mass index. Eighty patients with confirmed prostatitis were included in a case-control study and 60 persons as a control group. Three milliliters of venous blood were extracted using a disposable syringe in an aseptic manner from 80 patients and 60 healthy controls via venipuncture. After allowing the blood to coagulate in a gel tube, the serum was extracted using a 5-minute, 1500 rpm centrifugation. To be employed in the ELISA test, the serum was collected in an Eppendorf tube without ethylenediaminetetraacetic acid (EDTA) and then kept at  $-20^{\circ}\text{C}$ . The study found that the mean PSA level in the patient group was 7.65 ng/mL, whereas in the control group, it was 0.932 ng/mL. This difference was statistically significant ( $p = 0.001$ ), and significant relationship between PSA and BMI had an  $r$ -value of 0.207 ( $p = 0.18$ ), also significant relationship between PSA and age showed an  $r$ -value of 0.178 ( $p = 0.16$ ). These studies conclude that the body mass index consider as main factors for increase in prostatic specific antigen.

## Introduction:

Chronic prostatitis is a common condition affecting the male urinary system marked by infertility, sexual dysfunction, bladder problems, and pelvic pain or discomfort. The most prevalent symptoms, pain and lower urinary tract symptoms (LUTS), have a major negative influence on patients' quality of life as well as prompt them to request medical care. (Jiang, Z. et al., 2024). Prostate cancer is the most common cancer in men in Europe. In 2018, there were about 450,000 new cases and 107,000 deaths from this disease. (Ferlay, J. et al 2018). The test for a prostate-specific antigen (PSA) was developed in the late 1980s and early 1990s. It is a simple and low-cost way to find men who might have prostate cancer, even if they don't have any symptoms. By detecting cancer earlier, the chances of successful treatment and survival improve. (Osses, D. F. et al 2019). (PSA) is a test often applied to find prostate cancer. Most attention has been on using PSA tests for checking patients without symptoms. However, we know less about how accurate PSA tests are for diagnosing prostate cancer in patients who do have symptoms. (Merriell, S. W. 2022). In 1995, the National Institute of Health (NIH) divided prostatitis into four types. (Pena et al., 2021). The first type is Acute bacterial prostatitis (category I), which happens due to a bacterial infection, often from gram-negative bacteria like *Escherichia coli*. Patients may experience severe pelvic pain, painful urination due to swelling of the prostate, and a fever. And there are scarcely long term side effects of this type of prostatitis after antibiotic therapy Palapattu et al. (2005). One of the challenges in identifying the mechanisms of prostatitis is that while bacteria such as *Escherichia coli*, *Klebsiella*, *Enterobacter*, and *Pseudomonas* cause prostatitis in categories I and II (Pontari and Ruggieri, 2008), a higher proportion of cases are in category III, for which the etiology and pathogenesis are unknown. Weidner et al. (1991). Type III prostatitis, also known as chronic prostatitis/chronic pelvic pain

syndrome (CP/CPPS), accounts for more than 90% of cases. Infertility, irregular urine function, pelvic pain or discomfort, and sexual dysfunction are its main clinical symptoms. The most common and detrimental symptoms are pain and lower urinary tract symptoms (LUTS), which have a major negative influence on patients' quality of life and are the main causes of patient visits. (Pena et al., 2021). Sensitization of the prostate-bladder organ may be linked to LUTS in prostatitis, according to research by Aydogdu et al. (2021) as well as Funahashi et al. (2019). Pharmaceutical treatments (antibiotics, alpha-blockers, anti-inflammatory/immunomodulatory medications, etc.) are the primary clinical therapy for prostatitis. and non-pharmacological therapies (Franco et al., 2019; Pena et al., 2021). But in other instances, even when the inflammation of the prostate tissue goes away following therapy, prostate inflammation symptoms still exist, underscoring the necessity of creating novel therapeutic strategies.

### Methodiology:

In a case-control research, 60 people served as the control group and 80 patients with verified prostatitis. Age, body mass index (BMI), and clinical findings were gathered for every patient with prostatitis.

### Fully automated ELISA specialized kit for PSA detection.

Three milliliters of venous blood were extracted using a disposable syringe in an aseptic manner from 80 patients and 60 healthy controls via venipuncture. After allowing the blood to coagulate in a gel tube, the serum was extracted using a 5-minute, 1500 rpm centrifugation. To be used for the ELISA test, the serum was collected in an Eppendorf tube devoid of ethylin ditetracitic acid (EDTA) and then kept at  $-20^{\circ}\text{C}$ .

The elements as well as reagent of the ELISA kit used to measure the levels of PSA in patients. in this table illustrates.

**Table: The components and reagents of ELISA kit.**

	Reagent	Volume
1-	Coated Microplate	1 plate (8×12 wells)
2-	HRP Conjugate	1 vial of 6ml
3-	Calibrator	6 vials of 1ml
4-	Control	2 vials of 1ml
5-	Chromogen A	1 vial of 7ml
6-	Chromogen B	1 vial of 7ml
7-	Stop Solution	1 vial of 7ml
8-	Wash buffer	1 vial of 15ml

### Statistical analysis

**Table 1 distribution of study sample according to demographic and clinical data for study and control groups**

Age	Study		Control	
	Mean	S.D	Mean	S.D
	62.28	15.161	62.7000	12.72420
<b>BMI</b>	Mean	28.2	Mean	21.8
<b>PSA</b>	Mean	7.65	Mean	0.932

Study result show that mean age was approximately 62 years for study and control groups and body mass index higher in study groups. Also, value of PSA elevated in study groups

**Table 2 Correlations for control groups specific antigen concentration with age and BMI**

		Age	Body mass index
PSA	Pearson Correlation	.178	.207
	Sig. (2-tailed)	0.16	.0.18
	N	80	80

Table 2 show that there is significant correlation between PSA with age and BMI .

### Discussion

This study examines the relationship between PSA levels and prostatitis in both patients and the control group. Most patients with high PSA levels are 62 years of age or older, and the results indicate a Prostate inflammatory symptoms and higher PSA values are positively correlated with prostatitis. Patients with prostatitis and some patients with prostatitis had higher PSA levels than normal persons, who had PSA levels below or equal to the normal limit of 4.0 ng/ml. These findings are consistent with Salih et al. (2012) and suggest that a fast increase in PSA this indicate prostatitis (Laino 2006). Their findings demonstrate that, even with a little number of samples as well as an astonishingly high PSA even , aging and PSA level clearly indicate the development of illnesses to prostate cancer. It is not advised to use prostate-specific antigen (PSA) measurements in the diagnosis of acute bacterial prostatitis , as stated by Coker and Dierfeldt (2016). Touma and Nickel (2011) and Brede and Shoskes (2011), About 70% of men will experience an erroneous PSA rise as an effect of inflammation-induced disturbance of the prostate architecture. Ludwig (2008) After treatment, elevated PSA levels may continue for 1 to 2 months. Shoskes and Brede (2011) Since 20% of persistent rises are linked to cancer, prostate cancer should be taken into consideration if PSA levels are high for longer than two months. Ludwig (2008). Also, the findings of earlier research, which indicated a negative relationship between serum PSA and BMI (Fowke & Matthews, 2010 , Yelsel et al., 2015) Due to the excessive buildup of body fat or adipose tissue, obesity is a major related to the progression of abnormalities in insulin levels and sex hormone metabolism. By increasing levels of estrogen and estradiol and decreasing levels of testosterone and serum globulin-binding protein, it can cause benign prostatic enlargement . In benign prostatic hyperplasia nodules, the stromal/epithelial cell ratio may rise due to the increased estrogen/testosterone ratio linked to obesity [Bonn et al., 2016].

### Conclusions:

1. Prostatitis significantly increases PSA levels, which can affect the accuracy of prostate cancer screening using PSA alone.
2. The correlation between PSA and BMI had an r-value of 0.207 ( $p = 0.18$ ), also suggesting a significant relationship.

### Referance:

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