



## Prostate Specific Antigen (PSA) Profile in Prostate Disease at Hasan Sadikin Bandung General Hospital

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### ABSTRACT

PSA is a serine protease that functions to break down and liquefy semen clots that form after ejaculation. PSA is a product of the prostatic epithelium and is normally secreted in semen. The PSA test is usually used to diagnose prostate cancer, but it has a number of limitations. PSA can be increased in conditions of prostate gland disease, both benign and malignant. This is because PSA is specific for certain organs but is not specific only for cancer. This study aims to determine the profile of PSA in prostate disease at Hasan Sadikin Bandung General Hospital. This study involved 375 patients and is a retrospective descriptive study by taking medical record data from patients with prostate disease who went to the Urology Polyclinic during the period January-December 2019. The results of the study were processed with descriptive statistics and then presented in the form of tables and explanatory narratives. Based on the results of the study, patients with Benign Prostatic Hyperplasia (BPH) had a mean PSA value of  $8.05 + 32.31$  ng/ml, prostate cancer patients had a mean PSA value of  $188.75 + 344.67$  ng/ml and in prostatitis patients had the average PSA value is  $2.1 + 0.76$ . There are differences in PSA values in patients with BPH, prostate carcinoma, and prostatitis.

Keywords: BPH, Indonesia, Carcinoma prostate, Prostatitis, PSA.

### ABSTRAK

PSA merupakan suatu protease serin yang berfungsi untuk memecah dan mencairkan gumpalan semen yang terbentuk setelah ejakulasi. PSA ialah hasil dari epitel prostat dan pada keadaan normal disekresi dalam semen. Pemeriksaan PSA biasanya digunakan untuk mendiagnosis kanker pada prostat, tetapi masih memiliki sejumlah keterbatasan. PSA dapat meningkat pada kondisi penyakit kelenjar prostat baik jinak maupun ganas. Hal ini dikarenakan PSA bersifat spesifik untuk organ tertentu tetapi tidak spesifik hanya untuk kanker. Penelitian ini bertujuan untuk mengetahui profil PSA pada penyakit prostat di DR Hasan Sadikin Bandung General Hospital. Penelitian ini melibatkan 375 pasien dan merupakan penelitian deskriptif retrospektif dengan mengambil data rekam medis dari penderita penyakit prostat yang berobat ke Poli Urologi selama periode Januari-Desember 2019. Hasil penelitian diolah dengan statistika deskriptif kemudian disajikan dalam bentuk tabel dan narasi penjelasan. Berdasarkan hasil penelitian, pasien Benign Prostatic Hyperplasia (BPH) memiliki rerata nilai PSA sebesar  $8,05 + 32,31$  ng/ml, pasien karsinoma prostat memiliki rerata nilai PSA sebesar  $188,75 + 344,67$  ng/ml dan pada pasien prostatitis memiliki rerata nilai PSA sebesar  $2,1 + 0,76$ . Terdapat perbedaan nilai PSA pada pasien BPH, karsinoma prostat, dan prostatitis.

Kata Kunci: BPH, Indonesia, Kanker Prostat, Prostatitis, PSA.

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## INTRODUCTION

The prostate is a fibromuscular gland and organ located below the bladder. The normal prostate weighs about 20 grams and consists of the posterior urethra, with a length of 2.5 cm (Hamdy et al., 2017). According to Lowsley's classification, the prostate consists of five lobes: anterior, posterior, medial, right lateral and left lateral. This classification is often used in cystourethroscopic examination (McAninch & Lue, 2013). Prostate is composed of a thin fibrous capsule composed of smooth muscle and collagenous tissue that surrounds the urethra (involuntary sphincter). Just below the transitional epithelium of the prostatic urethra lies the periurethral gland (McAninch & Lue, 2013). The prostate produces a watery, milky prostatic secretion that makes up 20% of the semen component and plays an important role in sperm activation (Moore et al., 2013; De Visschere et al, 2019).

Prostate epithelium and periurethral glands can produce the Prostate Specific Antigen (PSA), which in normal circumstances is secreted in cement. PSA is a serine protease that functions to break down and liquefy semen clots that form after ejaculation. In general, PSA can be used for early detection of prostate cancer, especially in men aged > 50 years. PSA is an organ-specific biomarker but is not specific for cancer because it can also be used to examine Benign Prostatic Hyperplasia (BPH), prostatitis and prostate infarction. There is no evidence that prostatitis or BPH causes prostate cancer, but it is possible for a man to have one or both of these conditions and develop prostate cancer (Ilic et al., 2018; Cabarkapa et al., 2016).

Prostatitis is a diagnosis given to a group of men who experience various complaints in the lower urogenital tract and perineum. Based on the classification, prostatitis can be divided into bacterial prostatitis, granulomatous prostatitis, and pelvic pain syndrome and asymptomatic inflammatory prostatitis (Moore et al., 2013; Saad & Fizazi, 2015). Typical symptoms of prostatitis are complaints of lower urinary tract infections, such as a sudden increase in the frequency of urination, and dysuria and recurrent urinary tract infections in chronic infections (Moore et al., 2013; Naber & Weidner, 2000). Pelvic Pain Syndrome patients may experience slightly different symptoms, where the patient experiences chronic pelvic pain (perineal, testicular, penile, lower abdomen and ejaculation) and lasts for less than 3 months. Prostatitis can also cause asymptomatic conditions that usually can only be found on prostate biopsy examination. In some conditions, an increase in prostate-specific antigen (PSA) markers can be found so that it needs to be treated with antimicrobials and anti-inflammatory drugs, especially in asymptomatic cases (Naber & Weidner, 2000; Krieger, 2006).

Several pathological conditions can also be screened by PSA examination, including BPH and prostate cancer. BPH is characterized by histopathological changes, namely the presence of hyperplasia of stromal cells and epithelial cells of the prostate gland (McAninch & Lue, 2013; Gratzke, 2015; Brook & Wittert, 2014). To find out the clinical signs of BPH, a physical examination, digital rectal examination, and a neurological examination will be performed. The consistency and size of the prostate will be checked. The consistency of the prostate seen in BPH patients is usually soft and elastic. If induration is found, the possibility of prostate cancer should be estimated and additional evaluations such as Prostate Specific Antigen (PSA), Transrectal Ultrasound (TRUS) and biopsy should be performed (McAninch & Lue, 2013).

Prostate cancer is a malignancy that have early detection through PSA. Prostate cancer is also the most common cancer in older men in Europe (Mottet et al, 2015). Most cases of prostate cancer are identified in asymptomatic patients. The diagnosis is established by screening using PSA measurements and abnormal findings from the Digital Rectal Examination (DRE) (Skolarus et al., 2014). Prostate cancer is usually detected through DRE examination and PSA level measurement. Definitive diagnosis of this disease depends on histopathological findings of adenocarcinoma from prostate biopsy or from operative specimens (Mottet et al, 2015). Abnormal DRE examination in patients with PSA levels < 2 ng/mL has a positive predictive value (PPV) of 5-30%. Abnormal DRE is associated with an increased risk of higher severity and is an indication for biopsy (Cornford et al., 2021). So far, there are pros and cons to the use of PSA as a method for early detection of prostate cancer. The use of PSA for prostate cancer screening is thought to increase the number of men undergoing transrectal ultrasound guidance (TRUS) prostate biopsies to determine the presence of prostate cancer. On the other hand, there are still doubts about the indications for prostate biopsy based on PSA levels due to the consideration of other factors associated with prostate cancer which are also significant.

Due to the limited literature as well as pros and cons regarding the use of PSA as an early detection of prostate disorders, the researchers aimed to determine the profile of PSA in prostate disease at Hasan Sadikin Bandung General Hospital.

## RESEARCH METHOD

This study was conducted at Hasan Sadikin General Hospital Bandung during the period January-March 2021 with subjects consisting of prostate disease patients seeking treatment at the Urology Polyclinic Hasan Sadikin General Hospital Bandung for the period January-December 2019. This study consisted of independent variables in the form of age and prostate pathology condition in patients (prostatitis, BPH, prostate cancer) and PSA levels as dependent variables.

This study was a retrospective descriptive study conducted with medical record data collection method and aims to determine the profile of Prostate Specific Antigen (PSA) in prostate disease at Hasan Sadikin Bandung General Hospital. This study was conducted on patients with prostate disease who were treated at the Urology Poly Hasan Sadikin Bandung General Hospital during the period January-December 2019. The research subjects must be patients diagnosed with prostate disease, registered as an Outpatient Installation at Hasan Sadikin Bandung General Hospital and willing to be included. in this research. The exclusion criteria in this study were prostate disease patients with missing or incomplete medical record data.

The minimum sample size was determined based on the sample size formula for categorical descriptive studies with 95% confidence intervals. Meanwhile, the researcher determined the prevalence value of 10% obtained from the literature study and the error set by the researcher was 5%, so that the number of samples was  $n = 145$ , by adding the assumption of missing or incomplete medical record data with a range of  $10\% \approx 5$ . Then the number of samples becomes  $145 + 5 = 150$ . This study used secondary data, namely medical records of prostate patients who seek treatment at the Urology Poly Hasan Sadikin Bandung General Hospital during the period January-December 2019. The results of the examination are tabulated in excel form for later data processing. The results of the study were obtained with descriptive statistics and then presented in the form of tables and explanatory narratives.

## RESULTS OF STUDY

There were 470 patients with prostate disease at the Urology Poly Hospital Dr Hasan Sadikin Bandung for the period January - December 2019, 390 (83.33%) patients with Benign Prostate Hyperplasia and 78 (16.67%) prostate carcinoma patients with an average age of 66, 73 + 11.66 years and an age range of 1 to 89 years. Of the 470 patients, 95 patients were excluded due to incomplete PSA examination data so that 375 patients were obtained with 299 (79.73%) patients being diagnosed with BPH, 74 (19.73%) patients being diagnosed with prostate cancer, and 2 (0,73%) patients being diagnosed with prostate cancer. 53%) patients were diagnosed with prostatitis. The mean age of patients with a diagnosis of BPH was 66.26 + 12.24 years and the mean age of patients with prostate carcinoma was 67.98prostate + 8.02 years, while the mean age of patients with a diagnosis of prostatitis was 71 + 7.07 Demographic characteristics of patients with prostate disease was shown in table 1.

**Table 1 Demographic Characteristics and PSA Profile in Patients with Prostate-Disease**

Characteristics	BPH	Ca Prostate	Prostatitis	Total
Total (n)	299	74	2	375
Percentage (%)	79,73	19,73	0,53	100
Age (mean + std)	66,26 + 12,24	67,98 + 8,02	71 +7,07	
Age group (n, %)				
0 -18	3 (1,00%)	0	0	
>18-24	1 (0,33%)	0	0	
>24-30	1 (0,33%)	0	0	
>30-50	15 (5,02%)	0	0	
>50-60	44 (14,72%)	16 (21,62%)	0	
>60-70	126 (42,14%)	35 (47,30%)	0	
>70-80	89 (29,76%)	21 (28,38%)	1 (50%)	
>80	20 (6,70%)	2 (2,70%)	1 (50%)	
PSA value (ng/ml)	8,05 + 32,31	188,75 + 344,67	2,1+0,76	

In patients with a diagnosis of BPH, the average PSA value was 8.05 + 32.31 ng/ml, while in patients with a diagnosis of prostate carcinoma the average PSA value was 188.75 + 344.67 ng/ml and in patients with a diagnosis of prostatitis obtained a mean PSA value of 2.1 + 0.76. PSA profile based on diagnosis of prostate disease and PSA profile based on age group in patients with prostate disease are shown in Tables 2 and 3 as follows.

**Table 2 Profile of Prostate Specific Antigen (PSA) based on prostate disease**

Prostate disease	Normal PSA (<4ng/ml)	Increased PSA (4ng/ml)	Total
BPH	163 (54,51%)	136 (45,49%)	299 (100%)
Ca Prostate	5 (6,76%)	69 (93,24%)	74 (100%)
Prostatitis	2 (100%)	0 (0%)	2 (100%)

**Table 3 Average PSA Value by Age Group**

Age (years)	BPH	Ca Prostate	Prostatitis
0-18	1,82	N/A	N/A
>18-24	1,50	N/A	N/A
>24-30	3,60	N/A	N/A
>30-50	3,88	N/A	N/A
>50-60	5,26	267,00	N/A
>60-70	11,49	174,39	2,64
>70-80	5,83	167,70	1,56
>80	7,04	137,40	N/A

In this study, 375 patients with prostate disease met the inclusion and exclusion criteria with 299 (79.73%) patients being diagnosed with BPH, 74 (19.73%) patients being diagnosed with prostate carcinoma, and 2 (0.53%) being diagnosed with a diagnosis of prostatitis. The mean age of patients with a diagnosis of BPH was 66.26 + 12.24 years and the average age of patients with prostate carcinoma was 67.98 + 8.02 years, while the mean age of patients with a diagnosis of prostatitis was 71 + 7.07. BPH is the most common benign tumor in men, and its incidence increases with age (McAninch & Lue, 2013). The exact incidence of BPH in Indonesia has never been studied, but as an illustration of the hospital prevalence from 1994 to 2013 it was found that there were 3,804 cases with an average age of patients ranging from 66.61 years at Cipto Mangunkusumo Hospital (RSCM) (Chaidir et al., 2015). Prostate carcinoma is the most common cancer in older men in Europe (Mottet et al, 2015). Although only 1 in 350 men under the age of 50 will be diagnosed with prostate cancer, the incidence increases to 1 in every 52 men for ages 50 to 59. The incidence is almost 60% in men over the age of 65 years (Mottet et al, 2015).

In patients with a diagnosis of BPH, the mean PSA value was 8.05 + 32.31 ng/ml, while in patients with a diagnosis of prostate carcinoma the average PSA value was 188.75 + 344.67 ng/ml and in patients with the diagnosis of prostatitis obtained a mean PSA value of 2.1 + 0.76. In BPH patients, 163 (54.51%) patients had normal PSA values (< 4 ng/ml), while 136 (45.49%) patients had elevated PSA values (> 4 ng/ml). Meanwhile, in patients with prostate carcinoma, as many as 5 (6.76%) patients had normal PSA values and 69 (93.24%) patients had increased PSA values. All patients with a diagnosis of prostatitis in this study had normal PSA values.

PSA assessment was performed to measure PSA levels in men's blood. PSA levels in the blood are often elevated in men with prostate cancer. In addition to prostate cancer, a number of benign (noncancerous) conditions can cause a man's PSA level to rise. Benign prostate conditions that most often cause elevated PSA levels are prostatitis (inflammation of the prostate) and benign prostatic hyperplasia (BPH) (enlarged prostate). There is no evidence that prostatitis or BPH causes prostate cancer, but it is possible for a man to have one or both of these conditions and develop prostate cancer (Ilic et al., 2018; Cabarkapa et al., 2016).

In a study conducted by Thompson et al, it was found that 6 prostate cancer samples were obtained from 10 patients who had a normal PSA (4.0 ng/mL or less). With the number of prostate cancer patients 10.1% with PSA levels 0.6-1.0 ng/mL and increasing the number of patients to 26.9% with PSA ranging from 3.1 to 4.0 ng/mL. With this statement, it cannot be ascertained that a person who has a normal PSA value does not have a risk of prostate cancer (Solang et al., 2016).

A limitation of the PSA is that although its value is organ specific, it is not specific for cancer, BPH, prostatitis, and prostate infarction (Krieger, 2006). However, in this study there was a higher increase in PSA values in prostate cancer patients. Instrumentation for prostate and ejaculatory examinations can also increase serum PSA levels. In contrast, 20% to 40% of prostate cancer patients have PSA levels of 4 ng/mL or less (McAninch & Lue, 2013).

In this study, the most patients with BPH and prostate carcinoma were in the age group > 60 to 70 years, as many as 126 of 299 patients (42.14%) suffered from BPH and 35 (47.30%) of 74 patients with prostate carcinoma. In a study conducted by Wulansari et al., 28 patients (15%) had prostate disease, including 22 patients with BPH, 6 patients with BPH with prostatitis. At the age of 61-70 years there were 71 (37%) patients with prostate disease, consisting of 55 patients with BPH, 4 patients with prostate cancer, 14 patients with BPH with prostatitis. Age 71-80 years of patients affected by prostate disease as many as 71 (37%) patients consisting of 2 patients with prostatitis, 59 patients with BPH, 2 patients with prostate cancer, 8 patients with BPH with prostatitis. Age 81-93 years there were 20 (11%) patients with prostate disease consisting of 11 patients with BPH, 2 patients with prostate cancer, 7 patients with BPH with prostatitis. This is supported by research conducted by Valdo R. Solang, Alwin Monoarfa and in 2013-2015 at Kandou Manado General Hospital which stated that there were 54 patients with a diagnosis of prostate cancer and the most age group was 61-70 years old with 20 cases ( 37.0%) followed by age 71-80 years with 18 cases (33.3%) and at least <51 years with 1 case (1.8%). 18 Generally prostate cancer affects older adult men with a peak at the age of 65-75 years (McAninch & Lue, 2013).

In conclusion, in this study, we obtained 375 patients with prostate disease who met the inclusion and exclusion criteria with 299 (79.73%) in the diagnosis of BPH patients, 74 (19.73%) in the diagnosis of patients with prostate carcinoma, and 2 (0.53%) of patients with a diagnosis of prostatitis. The mean age of patients with a diagnosis of BPH was 66.26 + 12.24 years and the average age of patients with prostate carcinoma was 67.98 + 8.02 years, while the mean age of patients

with a diagnosis of prostatitis was 71 + 7.07. The prevalence of BPH and prostate carcinoma was mostly found in the age group > 60 to 70 years.

There are differences in PSA values in patients with BPH, prostate carcinoma, and prostatitis. In patients with a diagnosis of BPH, the average PSA value was 8.05 + 32.31 ng/ml, while in patients with a diagnosis of prostate carcinoma the average PSA value was 188.75 + 344.67 ng/ml and in patients with a diagnosis of prostatitis obtained a mean PSA value of 2.1 + 0.76. In BPH patients, 163 (54.51%) patients had normal PSA values (< 4 ng/ml), while 136 (45.49%) patients had elevated PSA values (> 4 ng/ml). Meanwhile, in patients with prostate carcinoma, as many as 5 (6.76%) patients had normal PSA values and 69 (93.24%) patients had increased PSA values. All patients with a diagnosis of prostatitis in this study had normal PSA values.

## CONCLUSION

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