Demographic Implications of Serum Prostate-Specific Antigen Screening Among Men in Bukuru and Environs

Bot D Yakubu[1], Olaniru B Olumide[2] and Bigwan T Yanan[1]*

[1]*Department of Medical Laboratory Science, Faculty of Health Sciences and Technology, University of Jos, Plateau State, Nigeria*

[2]*Department of Chemical Pathology, Jos University Teaching Hospital Jos, Plateau State, Nigeria*

*Corresponding Author: Bigwan T Yanan, Department of Medical Laboratory Science, Faculty of Health Sciences and Technology, University of Jos, Plateau State, Nigeria.

Abstract

A case study was conducted to screen Prostate-specific antigen levels of 50 elderly Men and understand their risk for Prostate cancer, the study was conducted at Church of Christ in Nations (COCIN) LCC Bukuru and its environs. Those included were asymptomatic elderly males of age 50 years and above at COCIN LCC Bukuru and environs, those who filled the consent form and agreed to be part of the studies and those that have not been previously diagnosed with prostate cancer or any form of cancer. Those excluded from this study were Men below the age of 50 years at COCIN LCC Bukuru and environs, those who did not fill the consent form or did not agree to be part of the studies, those previously diagnosed with prostate cancer or any form of cancer, Men that were sick. 8(16%) participants were diagnosed with PSA levels above the normal range, and 42(84%) were below the normal range. A blood sample (5 ml) was collected via venipuncture and the serum was assayed for PSA using chemiluminescence immunoassay method.

Based on the body mass index of the target population, individuals under 18.5 (underweight) were 2(4%), individuals from 18.5-25 (normal weight) were 24(48%), individuals from 25-30 (overweight) were 16(32%), individuals at 30 and above (obese) were 8(16%). Based on the demographic characteristics, the number of participants in the age group 50-59 had 28(56%) individuals; 60-69 had 11(22%) individuals; 70-79 had 6(12%) individuals; 80 years and above 5(10%) age in the study. The mean ± SD of PSA levels of men based on body mass index (BMI) of fifty (50) participants were screened. Individuals under 18.5 were 2(4%) had 4.81 ± 5.95, participants between 18.5 - 25 were 24(48%) had 2.62 ± 4.63, individuals between 25 - 30 were 16(32%) had 2.06 ± 2.75 and participants above 30 BMI were 8(16%) had 2.39 ± 2.15, with a mean of 2.49 ± 3.74 and a P-value of 0.808.

Keywords: Prostate Specific Antigen; Screening; Men; Bukuru

Introduction

The Prostate-specific antigen (PSA) is a protein being produced primarily in cells within the prostate gland and is also referred to as gamma-seminoprotein or kallikrein-3 (KLK3), P-30 antigen. The prostate-specific antigen is a glycoprotein enzyme encoded in humans by the KLK3 gene. The prostate-specific antigen is also a member of the kallikrein-related peptidase family [1]. It's a small gland in males that encircles the urethra and produces a fluid that forms up a part of the semen, most of the prostate antigen that the prostate produces is released into this fluid, but small amounts of it are released into the blood. Prostate-specific antigen exists in two states within the blood, as complexed to proteins or free [2]. The discovery of PSA is studded with controversy; as PSA is present in

prostatic tissue and semen, it had been independently discovered and given different names, thus adding to the talk [3].

The prostate-specific antigen is also used as a tumor marker to screen for and to observe prostatic adenocarcinoma. The goal of screening is to detect prostatic adenocarcinoma in men from 40 years old and above while it's still confined to the prostate. Elevated blood levels of prostate-specific antigen are related to prostatic adenocarcinoma, but it's going to be observed in other conditions like prostatitis and benign prostate hyperplasia [4].

The primary goal of PSA screening is to forestall and reduce deaths because of prostatic adenocarcinoma through early detection and prompt management. Men with detected cancer can potentially constitute 1 of the three categories: Those whose cancer will lead to death despite early diagnosis and treatment, people who will have good outcomes within the absence of screening, and people for whom early diagnosis and treatment improve survival [5].

Various medical organizations have contradictions within the current guidelines on screening for PSA levels. The American Urological Association and therefore the American Cancer Society recommended screening for all men aged 50 years and above with a life of quite ten years and also men aged 40-45 years who are at high risk for the condition like African Americans and people with affected first-degree relatives [6]. However, the National Cancer Institute and therefore the United States Preventive Service Task Force failed to recommend routine screening for glandular carcinoma within the general population or at-risk groups like blacks [5]. This is often because evidence shows that PSA-based screening programs detect many cases of asymptomatic prostatic adenocarcinoma that either won't progress or will progress so slowly that it might have remained asymptomatic for the man's lifetime. The terms "over-diagnosis" or "pseudo-disease" are accustomed to describe both situations [6]. Adenocarcinoma is the commonest cancer among Nigerian men and therefore the most commonest explanation for death from cancer in men worldwide [7]. Glandular carcinoma is more common in blacks and mixed-race men than in men of European or Asian descent [8].

Study shows that one-third of the cases of prostate cancer will be prevented, and one-third can also be cured if detected early through screening [9]. Population studies have shown increased survival benefits within the early treatment of prostatic adenocarcinoma following the screening. there's also evidence that the recent decline in cancer mortality in several developed countries resulted from annual screening and early detection. Other screening tests, like digital rectal examination and ultrasonography, also are essential in diagnosing prostatic adenocarcinoma. Studies in Nigeria have shown that knowledge of prostatic adenocarcinoma awareness was generally low. this might cause an absence of annual screening, which benefits the populace [7].

The body mass index (BMI) value is derived from the mass and height of someone. The BMI is defined by dividing the body by the square of the body height and is expressed in units of kg/m^2, arising from mass in kilograms and height in meters. The BMI categorizes individuals as underweight, normal weight, overweight, or obese supported by tissue mass and height. The BMI ranges are: underweight (under 18.5 kg/m^2), normal weight (18.5 to 25), overweight (25 to 30), and obese (over 30) [10]. High Body mass index has been directly related to the danger of aggressive or fatal glandular carcinoma. One possible explanation could also be the effect of BMI on serum levels of prostate-specific antigen (PSA) [10]. Obesity has been reported to scale back serum PSA levels. Delayed early detection may partially explain worse outcomes in obese men with early prostatic adenocarcinoma. After treatment, a better body mass index also correlates to the next risk of recurrence [11].

Materials and Methods
Study population

This study had 50 men from COCIN LCC Bukuru and environs who participated. All the men who participated were 50 years and above. A consent form and questionnaire were given to each participant. The study took place in Plateau State, Nigeria.

The inclusion criteria were: Asymptomatic elderly males of 50 years of age and above at COCIN LCC Bukuru and environs, those who filled the consent form and agreed to be part of the studies, and those that have not been previously diagnosed with prostate cancer or any form of cancer.

The exclusion criteria were: Men below 50 years of age at COCIN LCC Bukuru and environs, Men outside of the Bukuru area, those who did not fill the consent form or did not agree to be part of the studies, those previously diagnosed with prostate cancer or any form of cancer, Men that were sick.

Ethics

Ethical clearance was obtained from Plateau State Specialist Hospital, Jos, Plateau State, Nigeria.

Data analysis

The statistical significance, the mean, and standard deviation of the results were ascertained using the one-way analysis of variants (ANOVA) in the SPSS (Statistical Package for the Social Sciences) software version 26. $P \leq 0.05$ was considered statistically significant.

Results

A total of 50 men were enrolled in the study. 8(16%) participants were diagnosed with PSA levels above the normal range, and 42(84%) were below the normal range.

Based on the body mass index of the target population, individuals under 18.5 (underweight) were 2(4%), individuals from 18.5-25 (normal weight) were 24(48%), individuals from 25-30 (overweight) were 16(32%), individuals at 30 and above (obese) were 8(16%). Based on the demographic characteristics, the number of participants in the age group 50-59 had 28(56%) individuals; 60-69 had 11(22%) individuals; 70-79 had 6(12%) individuals; 80 years and above 5(10%) age in the study.

Table 1 shows the mean levels of PSA according to the demographic characteristics of the research participants.

Demographic characteristics	N (%)	Mean (ng/ml)	SD ±	F-value	P-value
Age group (years)					
50 - 59	28(56%)	1.4514	1.71979	9.880	0.000
60 - 69	11(22%)	1.3555	.99510		
70 - 79	6(12%)	7.7817	8.04729		
80+	5(10%)	2.4910	3.19899		
Awareness about PSA					
Have heard	39(78%)	2.1049	2.36975	13.747	0.172
Never heard	11(22%)	3.8600	6.68188		
Done a PSA test before					
Yes	5(10%)	2.8420	1.66342	14.284	0.828
No	45(90%)	2.4520	3.91544		
Occupation of participant					
Farming	4(8%)	1.0975	.84065	13.996	0.413
Artisan	4(8%)	1.1350	.63940		
Civil servant	2(4%)	.7700	.35355		
Businessmen	17(34%)	1.8412	2.76889		
Retirees	23(46%)	3.5991	4.78490		
Family history of prostate cancer					
Yes	10(20%)	2.8470	2.17344	14.265	0.740
No	40(80%)	2.4020	4.05793		

Table 1: Mean levels of PSA according to demographic characteristics of study participants.

KEY: n= Number of Participants Examined, SD= Standard Deviation.

	n	%	Mean (ng/ml)	SD ±	P-value
Clinically significant	8	16.0	9.3600	5.47809	0.8340
Not clinically significant	42	84.0	1.1826	0.80960	

Table 2: Prevalence of PSA.

KEY: n= Number of participants examined, %= Percentile, SD= Standard deviation.

Table 2 shows the prevalence of serum PSA values among the target population. The clinically significant was 9.36 ng/ml above the normal range, which is 4.0 ng/ml, while the participants below the normal range were considered not clinically significant; they were 42(84%) with a Mean of 1.18 ± 0.81 and a P-value of 0.83 that is greater than 0.05.

BMI kg/m²	Mean (ng/ml)	N	SD ±	P-value
UNDER 18.5	4.8050	2	5.94677	0.808
18.5 - 25	2.6213	24	4.62580	
25 - 30	2.0575	16	2.75168	
30+	2.3888	8	2.10445	
TOTAL	2.4910	50	3.74248	

Table 3: PSA value based on BMI.

KEY: BMI= Body mass Index n= Number of participants examined, SD= Standard Deviation.

Table 3 shows the mean ± SD of PSA levels of men based on body mass index (BMI) of fifty (50) participants who were screened. Individuals under 18.5 were 2(4%) had 4.81 ± 5.95, participants between 18.5 - 25 were 24(48%) had 2.62 ± 4.63, individuals between 25 - 30 were 16(32%) had 2.06 ± 2.75 and participants above 30 BMI were 8(16%) had 2.39 ± 2.15, with a mean of 2.49 ± 3.74 and a P-value of 0.808.

Discussion

Prostate-specific antigen screening is a fundamental step in identifying early prostate cancer; PSA screening has also been used to monitor prostate cancer treatment. This has been of great importance in reducing the growing burden of prostate cancer in developed and developing countries. Our results showed a high level of a prostate-specific antigen in men above 50 years of age, as reported by Mandong., *et al.* (2015) [12] and Jibril., *et al.* (2019) [13]. This study showed that underweight participants had higher PSA levels than obese individuals and those with normal weight. This relates to studies carried out by others [12-15]. However, when other confounding factors like age, diabetes mellitus, BPH, and Current use of Aspirin or other NSAIDs were put together in one of those studies, this became insignificant [15]. A theory considered responsible for lower PSA levels in Obese men is hemodilution due to a higher plasma volume [12]. Aspirin and NSAIDs have been linked to lower levels of PSA [16].

We also observed high PSA levels in men above 70years of age 7.78. This could be because it is common among people under 70 and above to experience a slight increase in PSA serum levels [17]. Age specificity serum PSA had been introduced to improve the sensitivity and specificity of the PSA test because as men age, their prostates increase in volume and become more permeable due to the breakdown of the normal physiological barriers, thereby allowing PSA to leak into general circulation. This expansion in prostate size has been more pronounced in blacks than Caucasians, contributing to why black men seem to have higher total PSA concentrations than their Caucasian, Chinese and Japanese counterparts [18].

The results in this study suggest that awareness and specific knowledge related to prostate cancer screening is low, a similar observation made by Okolo., *et al.* (2008) [20], and over ten years later, improvement was not recorded. In the study, 39(78%) have heard about PSA screening, yet only 5(10%) have completed the test.

Limitations

While interpreting this study, some of these limitations should be considered. Medical history was based on participants' reports, medications, and lifestyles. We also did not have enough data to look at other possibilities.

Conclusion

Generally, the investigation showed that there was a high level of prostate-specific antigen (PSA) among men in Bukuru and environs, meaning there might be prostatitis, benign tumor, or prospective prostate cancer. Men above the age of 70 have a higher PSA level than men below 60. This study also found that the mean serum PSA level was higher in underweight participants, and generally, BMI played an integral role in determining individual serum PSA levels. These findings strengthen the need for annual screening among men in the Nigerian population and weaken the use of hospital registry reports to demonstrate the prevalence of prostate cancer in Nigeria.

Recommendations

Based on the results of this work, we wish to recommend that:

- More research is needed to establish the prevalence of prostate-specific antigens among men in Nigeria.

- Governments and health policymakers should create more awareness of the need for regular screening to curb this growing disease.

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