Pattern of Prostate-specific antigen (PSA) in male participants 40 -70 years screened for prostate cancer during a medical outreach in a tertiary institution in Nigeria: A pilot study

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ABSTRACT

Objective: To study the pattern of prostate specific antigen (PSA) expression in apparently healthy male participants 40-70 years screened for prostate cancer during a medical outreach programme organized for the University of Calabar Community.

Materials and method: Sixty one (61) apparently healthy men aged 40-70 years attending a medical outreach in the University of Calabar were recruited into the study. It was a cross sectional descriptive study in which screening for PSA was done using 1mL of blood sample collected via venipuncture from the participants while sitting and relaxed. Two drops of whole blood and a drop of buffer solution were introduced via a dropper onto a Diaspot rapid one-step test device and results read after five (5) minutes.

Result: PSA values were categorized based on age groups of 40-49 years, 50-59 years, and 60-70 years. 81.8%, 9.1% and 9.1% of the participants of age 40-49 years had values less than 4.0ng/ml, 4.0-10.0ng/ml, and above 10.0ng/ml respectively. 55.6%, 18.5%, and 25.9% of participants between 50-59 years age group had values of <4.0ng/ml, 4.0-10.0ng/ml, and

>10.0ng/ml respectively. While 66.7%, 16.7%, and16.7% of participants age 60 years and above had PSA values of <4.0ng/ml, 4.0ng/ml, and >10.0ng/ml respectively.

Conclusion: This study showed the pattern of prostate-specific antigen (PSA) across the various age groups 40-70 years screened for prostate cancer. It revealed insidious prostatic disease even among apparently healthy males which further strengthened the fact that prostate cancer disease could be detected early through screening for prostate-specific antigen concentration. This is a wake-up call to health policy makers of the need to introduce routine screening programmes for aging males 40 years and above in Nigeria.

Key words: PSA pattern, PSA screening, early detection, Healthy males, University of Calabar, medical outreach.

Introduction

Prostate-specific antigen (PSA) is one of the most used biomarker tool in the screening, prediction, detection and follow-up management of prostate cancers and benign prostatic hyperplasia.[1] Prostate cancer can be seen in one out of every six to eight men in their life time.[1, 2] Among Nigerian men prostate cancer has become the leading cause of cancers with an incidence of 300 per 100000 male population.[3] However, the true prevalence is yet to be unraveled.[4] It is now being diagnosed even in younger age groups 10 years earlier in African men than the age of presentation in western climes.[3, 5] Prostate cancer if detected early can achieve remission and improve quality of life of patients.[6] Prostate cancer screening is designed to detect asymptomatic patients and those in early disease. It is a robust path finder evaluation strategy that primes further evaluation of the prostate with other more invasive approaches to attain early diagnosis of prostate cancer in affected individuals. Its cost effective benefit is expressed in number of years of life saved by screening.[7] In Nigeria however, just like most African countries, there are no screening programmes in place to serve the increasingly aging male population.[3-5, 8] This is a setback which has led to late presentation of Nigerian men with advance disease to health facilities.[3] In countries where screening programmes exist, there is early diagnosis and treatment of prostate cancer thereby reducing the rate of metastatic disease as well as prostate cancer related deaths.[9] In the US, a study reported a decline of 39% of prostate cancer related mortality within a period of 16 years, which was attributed to the positive outcome of prostate cancer

screening programme.[10] There is an increase prevalence of prostate cancer in contemporary times due to increase life expectancy and expansion in the geriatric population which makes more men likely to suffer prostate cancer in their life time, making it an important public health issue.[2] The increasing prevalence of prostate cancer also is as a result of the use of improved screening methods especially with the use of PSA as the biomarker of choice.[11] when the US for over a decade, placed restrictions on the screening policy for prostate cancer, a 72% increase incidence of men presenting with advance disease of the prostate was reported and this created a lot of agitation in the public health space.[10, 12] This underscores the need for continuous prostate cancer screening practices for early detection and treatment benefits. This pilot study explored the pattern of PSA status among apparently healthy men to highlight the immense benefits of screening for latent prostate cancer in Nigerian men.

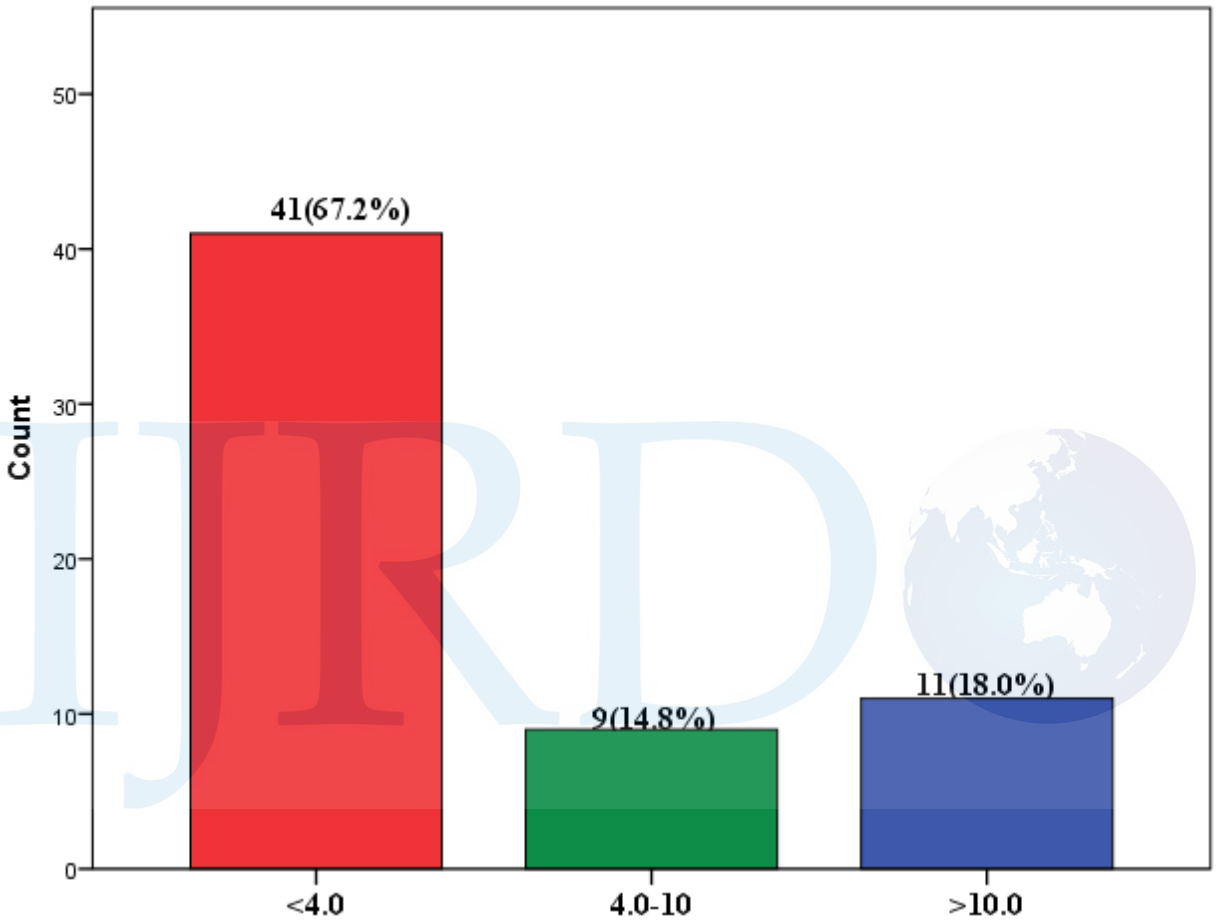
Materials and method

The study was conducted in the University of Calabar community during a medical outreached. It was a cross sectional descriptive study that recruited sixty one participants. The participants who were between 40 to 70 years of age were selected into the study from 200 men based on conformity with the inclusion criteria. Participants were excluded if they have had (1) ejaculation in the past 3 days (2) previous history of prostate disease (3) previous pelvic surgery (4) Prostate biopsy (5) Urinary retention (6) drug therapy with PSA inhibitors. Participants were allowed to relax and 1ml of their whole blood specimen was collected into plain test tubes before any prostate manipulative procedures. Two drops of the whole blood were immediately sampled onto the test chamber of the Diaspot rapid one-step device which uses dry chemistry immunoassay principle. A drop of buffer solution was then added and allowed to incubate for five (5) minutes. Results were then read off and interpreted semi-quantitatively.

Results

The participants PSA results were stratified into three age groups and PSA concentrations also into three categories based on the conventional cutoff values of <4.ong/ml, 4.0-10ng/ml and >10.0ng/ml suggestive of normal, intermediate or grey zone, and abnormal values respectively. The age groupings were 40-49 years, 50-59, and 60-70 years and had a percentage representation of 36.1, 44.3 and 19.7 of the total participating population respectively. Mean age of participants

was 52.03 years. 67.2% of the entire participating population had PSA values <4.0ng/ml, 14.8% had PSA values of 4.0-10.0ng/ml while 18.0% of them had PSA values >10.0ng/ml as shown in the bar chart below.



Bar chart showing percentage distribution of the participants according to the respective PSA values.

PSA values were examined within the three age groupings of 40-49 years, 50-59 years, and 60-70 years. 81.8%, 9.1%, and 9.1% of participants within the age group of 40-49 years had PSA values of <4.0ng/ml, 4.0-10.0ng/ml and >10.0ng/ml respectively. 55.6% of participants within the age group of 50-59 years had PSA values of <4.0ng/ml, 18.5% had values of 4.0-10.0ng/ml, while 25.0% of them had PSA values >10.0ng/ml. within the age group of 60-70 years, those

that had PSA values of <4.0ng/ml were 66.7%, those with PSA values of 4.0-10.0ng/ml were 16.7% and participants with PSA values >10.0ng/ml were also 16.7%. This is demonstrated in the table shown below.

Association between PSA concentration and age group of subjects

	Prostate serum antigen		
	<4.0	**4.0-10.0**	**>10.0**
Age group (years)			
40-49	18(81.8)	2(9.1)	2(9.1)
50-59	15(55.6)	5(18.5)	7(25.9)
60-70	8(66.7)	2(16.7)	2(16.7)

X^2=3.933, df=4, p-value=0.415

Discussion

Prostate cancer is a disease of aging men worldwide but early detection can decrease metastatic disease and enhance treatment and improve quality of live for affected individuals. Screening programmes with prostate-specific antigen (PSA) evaluation as a biochemical marker of the prostate organ are of proven immense benefits in the early detection of prostate cancer. In Nigeria there are no deliberate policies on ground to ensure the screening of males at risk of prostate cancer resulting in late presentation with advanced disease.[4] This pilot study showed values of PSA in a range suggestive of prostate organ disease in a younger population not considered at risk of prostate cancer and in apparently healthy men within the catchment group for risk of prostate cancer which was in conformity with the thoughts of Bowa in his study in 2010.[3] The current study revealed a high percentage of participants, though apparently healthy, with PSA values in the grey zone of PSA level at which most Nigerian men, in combination with digital rectal examination, have been diagnosed with prostate cancer in the past and is in agreement with a previous hospital-based study in Nigeria.[13] Though the benefits of screening

for prostate cancer had been fraught with controversy by many authors, this study showed clearly that there were benefits to be gained by screening for prostate cancer through the demonstration of significantly high PSA values across the ages of 40-70 years in apparently healthy individuals. The study, even though a pilot study with a small sample size, reflects the view of a community-based screening conducted in Lagos state, Nigeria which employed a larger population of participants.[4]

Conclusion

This study demonstrated a clear pattern of PSA concentration in the various age groupings between 40-70 years in which PSA values were seen also to be significantly elevated above the cutoff for healthy prostate in the age group of 40-49 years not usually considered at risk of prostate cancer. The study therefore underscored the importance of routine screening of the adult male population for prostate cancer disease, to enhance early diagnosis and intervention. Though a pilot study with a small sample size, there was significant insight to a disturbing trend in the male population in Nigeria with serious public health concerns and has the potential of a surprising outcome with a larger sample size. However, prostate cancer screening with PSA is capital intensive and would require sponsorship for a larger population study.

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