Prevalence of Prostate Cancer among Men with Elevated Prostate Specific Antigen (PSA) Level in Ikwerre Local Government Area of Rivers State, Nigeria

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Abstract
The prevalence of prostate cancer among men of age above 40 years has been on the increase and early detection help in suppressing the progression of the disease. The study was undertaken to report the prevalence of elevated prostate specific antigen (PSA) in Isiokpo, Omagwa, Ubima and Elele towns, all in Ikwerre Local Government Area of Rivers State, South of Nigeria. Using the Enzyme linked immuno sorbent assay (ELISA) method, a total of 1,325 men, aged 40 years and above (median age of 59 years) was assessed for PSA between February 2007 and March 2010. A total number of 126 men had PSA values above 4.0ng/ml, representing 9.51 percent. The subjects with elevated PSA values, an indication for risk of developing prostate cancer, were also subjected to ultrasound scanning, digital rectal examination (DRE) and biopsy examination. Out of 126 men with raised PSA level, 99 eventually went for the scan and biopsy examination. A total number of 41 were diagnosed of prostate cancer, representing 41.41 percent. The remaining 59.57 percent with PSA values above 4.0ng/ml therefore have risk of developing prostate cancer.

Keywords: prevalence, prostate, prostate specific antigen, cancer, biopsy

INTRODUCTION
Prostate is the tubuloalveolar exocrine gland of the male reproductive system. It is about 3cm long, weighs about 20g and is located in the pelvis, under the urinary bladder and in front of the rectum (Meyers and Robert, 2000). The function of the prostate is to store and secrete a slightly alkaline fluid, milky or white in appearance, that usually constitutes 25-30% of the volume of the semen along with spermatozoa and seminal vesicle fluid (Babain et al., 1999). The prostate gland wraps around the urethra, the tube that carries urine from the bladder out of the tip of the penis. Prostate enlargement is often a natural part of aging process (Osterling, 1995). An enlarged prostate press on the urethra and causes difficulty with urination (Dennis et al., 2002) and other associated bladder problems that include weak urine stream, difficulty starting urination, leaking urine, and feeling like the bladder has not been completely emptied, frequent need to urinate, especially at night and frequent bladder infections.

Human prostate specific antigen (PSA) is a serine protease, a single chain glycoprotein with a molecular weight of approximately 34,000 Daltons containing 7% carbohydrate by weight. PSA is immunologically specific for prostate tissue; it is functionally and immunologically different from prostatic acid phosphatase (Heller, 1987).

The PSA test measures the level of prostate specific antigen in the blood. Its measurement in the blood can be used to detect disease. It’s sometimes called a biological marker or tumor marker. (Wang et al., 1981) because PSA elevation is not associated with healthy men or is it present in any other tissue obtained from man. Recent studies (Jermal et al., 2005) also indicate that PSA measurements can enhance early prostate cancer detection when combined with ultrasound scanning, digital rectal examination and biopsy.

Elevated PSA has been associated with prostatitis (Dennis et al., 2000) benign prostatic hyperplasia (BPH) (Christensen and Andriole, 2009) Prostate cancer (Kran et al., 1994) and inflammatory conditions of other adjacent genitourinary tissues which have been attributed to age, race, family history (Steinberg, et al., 1990) and hormonal factors (Wigle et al., 2008). Since it is normal for men to have a low level of PSA in their blood, this means that prostate cancer or benign (not cancerous) conditions can increase men PSA levels. As man age,
both benign prostate conditions and prostate cancer become more common. This prevalence study was undertaken to see the possibility of detecting early the men with elevated PSA and probably prostate cancer. Early prostate cancer detection helps the patient to manage the condition better and probably extend its associated side effects and consequently death (Smith et al, 1997), even though this has been a subject of debate.

MATERIAL AND METHODS

Study Area
The study was carried out in Isiokpo, Omagwa, Ubima and Elele towns, all in Ikwerre Local Government Area of Rivers State, South, South Nigeria. This is one of the largest local government in the state with a population of over 90,000 (Nigeria census, 2006). The people are mostly of peasant farmers, commercial drivers, few business persons and a number of them are civil servant workers. It is an Ikwerre speaking part of Rivers State.

Study Population
A total of one thousand, three hundred and twenty five (1,325) men were assessed for PSA levels between February, 2007 and March 2010. The study subjects were consented individuals who were interested in the study and also men who were receiving treatment in the general hospital and various health care centers in the local government area. All the subjects were men above the age 40 with median age of 59 years. Institutional ethical approval was received from the Department of Medical Laboratory Service of the hospital.

Samples Collection and Preparation
About 2.0ml of blood were collected from each subject using the standard venepuncture technique. The samples were discharged into clean plain tubes, allowed to clot and then centrifuged for 5 minutes at 3000rpm. The serum was collected with Pasteur pipette and stored frozen. Analysis was done within 7 days of collection.

Method of Assay
The enzyme linked Immunosorabent Assay (ELISA), method was used. The ELISA test is based on the principle of solid phase enzyme linked immunosorabent assay, where the antibody to be measured is incubated with specific antigen coupled to a solid phase (Vessella et al., 1992) and (Stowell et al., 1991)

FURTHER EXAMINATION
The men with an elevated PSA values (>4.0ng/ml) were sent to the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Rivers State for ultra sound scanning, digital rectal examination (DRE) and biopsy. One hundred and twenty six (126) men were sent for further examination, but with persuasion and encouragement, only ninety nine (99) went and had their biopsy test.

STATISTICAL ANALYSIS
The statistical analysis of the results was carried out using the SPSS statistical software version 15.0. The one way ANOVA was used to compare groups.

RESULTS
The mean PSA values and the percentage distribution of elevation respectively for the age groups are as shown in the tables 1 and 2 below.

The one way ANOVA analysis of the different groups shows that the difference between group one and two is not significant at 95% confidence level (>..05), but significant difference exist between group one and groups three, four and five. Significant different also exist between group two and groups three, four and five. The analysis also showed a significant difference (>0.05) between groups three and four and between four and five. The tool also showed that the percentage of men diagnosed of having prostate cancer was significant relative to the percentage of men with elevated PSA levels.

Table 1: Mean ± standard deviation of PSA values of the different age groups

<table>
<thead>
<tr>
<th>S/N</th>
<th>Age range(years)</th>
<th>Mean standard deviation of PSA values (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40-49</td>
<td>2.15±1.62</td>
</tr>
<tr>
<td>2</td>
<td>50-59</td>
<td>3.03±1.81</td>
</tr>
<tr>
<td>3</td>
<td>60-69</td>
<td>4.85±2.74</td>
</tr>
<tr>
<td>4</td>
<td>70-79</td>
<td>6.32±3.06</td>
</tr>
<tr>
<td>5</td>
<td>80 and above</td>
<td>9.74±4.51</td>
</tr>
</tbody>
</table>

Table 2: Distribution of normal and elevated PSA values with respect to age range

<table>
<thead>
<tr>
<th>S/N</th>
<th>Age range</th>
<th>Number tested</th>
<th>Normal</th>
<th>Elevated</th>
<th>Number Normal</th>
<th>Percentage Normal</th>
<th>Number Elevated</th>
<th>Percentage Elevated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40-49</td>
<td>522</td>
<td>508</td>
<td>14</td>
<td>14</td>
<td>97.32</td>
<td>2.68</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>50-59</td>
<td>416</td>
<td>396</td>
<td>20</td>
<td>20</td>
<td>95.19</td>
<td>4.81</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>60-69</td>
<td>245</td>
<td>209</td>
<td>36</td>
<td>36</td>
<td>85.31</td>
<td>14.69</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>70-79</td>
<td>105</td>
<td>78</td>
<td>27</td>
<td>27</td>
<td>74.29</td>
<td>25.71</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>80 and above</td>
<td>37</td>
<td>8</td>
<td>29</td>
<td>29</td>
<td>21.62</td>
<td>78.38</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Distribution of the Percentage of Men with Elevated PSA Values Diagnosed of Prostate Cancer

<table>
<thead>
<tr>
<th>Subject</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men for DRE and Biopsy diagnosed of prostate cancer</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>Men for DRE and Biopsy not diagnosed of prostate cancer</td>
<td>58</td>
<td>59</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>100</td>
</tr>
</tbody>
</table>
DISCUSSION
Prostate enlargement progresses with age in men and from published work, the level of PSA also increases with age (Morgan et al., 1996). This was observed from this study with higher percentage of elevation in older men (i.e. 25.71% in men between 70-79 years) and 78.38% in men of 80 years and above. From the study, as much as 41.41% of men with raised PSA levels were diagnosed of cancer with the remainder (either with prostate enlargement, prostatitis or benign prostatic hyperplasia) having risk of developing prostate cancer in this locality. This is in line with the work done by other authors, Potosky et al, (1995) and Welch and Albertsen (2009) which showed that elevated prostate specific antigen is an indicator to prostate cancer. In the community, the greater percentage of the population is not very educated, most people are at risk of developing a prostatic abnormality are not properly informed of the need and advantage of monitoring their prostate through digital rectal examination and PSA levels. It becomes pertinent therefore that men above 40 years of age should go regularly for prostate screening test and examination, which according to World Health Organization should be every six months after attaining the age of 40 years and above

REFERENCES


