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Prostate Specific Antigen Levels on Prostate Disorders in South-East Nigeria

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ABSTRACT

Prostate gland is a walnut sized organ located between the bladder and the penis. Prostate specific antigen (PSA) is a protein produced by normal, as well as malignant cells of the prostate gland. The PSA test measures the level of PSA in a man's blood. This study was aimed at investigating the assessment of prostate specific antigen (PSA) in prostrate disorders. Study was carried out on a total of 80 patients attending clinic and laboratory investigations from Achunike Hospital and St. Cyprian Hospital referred to Queens medical laboratories for prostate specific antigen assay. Subjects were divided into four groups (A, B, C and D) their ages between 40 to 80 years. Group A is the control group. This group comprises apparently healthy individuals who have no history of prostate disorder. Group B consists of subjects with Prostatitis. Group C and Group D are patients with Benign prostate hyperplasia and prostate cancer respectively. Blood samples were collected venous in a plain sterile tube, allowed to clot and serum sample separated for PSA assay using Enzyme linked Immunosorbent assay technique. The result of this study showed no significant ($p > 0.05$) change in PSA levels in group B diagnosed with prostatitis with mean values (2.84 ± 1.27). However, there was significant increase ($P < 0.05$) in PSA levels in subjects with Benign prostate hyperplasia (BPH) (14.11 ± 4.88) .The result of PSA levels in prostate cancer patients showed marked increase in PSA levels (19.64 ± 5.22) compared with control and also a remarkably higher PSA values compared with B and C ($p < 0.05$). Therefore this research work has shown that prostate specific antigen is elevated in both benign prostate hyperplasia and prostate cancer. It has also identified PSA as an important marker in differentiating prostate disorders caused by BPH and prostate cancer from disorders caused by prostatitis.
Keywords: Prostate Specific Antigen, Prostatitis, Benign Prostate Hyperplasia and Prostate Cancer.

INTRODUCTION

Prostate gland is a small gland that is about the size of a walnut and is a part of a male's reproductive system. It sits low the bladder and just in front of the rectum [1]. The prostate gland makes the seminal fluid and prevents urine during ejaculation due to the presence of the internal urethral sphincter complex within the prostate gland. Alkaline fluid produced by the prostate gland helps to nourish sperm and leaves the urethra as ejaculate [2]. The prostate gland is dependent on the hormonal secretion of the testes for growth and development [3]. The prostate growth accelerates at sexual maturity due to androgen action on both stromal and epithelial cells. Between the ages of 31 and 50 years, the prostate doubles in size every 4-5 years. Between the ages of 51 and 70 years doubling time increases to 10 years but above 70 years, the doubling is severely reduced. This implies that prostate increases more between the ages of 50 and 70 years [4]. The prostate gland is responsible for producing a light alkaline fluid for ejaculation. This fluid is ejaculated alongside the spermatozoa and the seminal fluid. It constitutes about 70 percent of the volume of semen ejaculated [5]. The alkalinity of the semen helps to

neutralize the acidity of the vaginal track. The composition of prostate secretion include prostate specific antigens, proteolytic enzymes in minute levels, prostatic acid and phosphates [6].

Prostate specific antigen (PSA) is a protein produced by normal as well as malignant cells of the prostate gland, although cancer cells produced more PSA than benign cells. The highest amount found in semenial fluid and few are found in the serum. PSA test is primarily used for the detection of PSA levels and presence of prostate disorders in male individuals. It was originally approved and used in conjunction with direct rectal examination (DRE) as approved by FDA in 1994 to aid detection of prostate disorders [7]. Prostate disorders are the diseases of the prostate gland. There are three most common types of prostate disorders: Prostatitis (inflammation of the prostate), Benign prostate hyperplasia (BPH) they are non cancerous enlargement of prostate and prostate cancer.

MATERIALS AND METHODS

RESEARCH DESIGN

The study of PSA levels on prostate disorders in South East Nigeria was designed to access prostate specific antigens (PSA) levels in prostate disorders which include; Prostatitis, Benign Prostate hyperplasia (BPH) and Prostate cancer. A total of 80 subjects were used in the investigation. These patients were referred from the clinics of Achunike and St. Cyprian hospital to Queens Biomedical laboratories Onitsha in South Eastern Nigeria. Their ages ranges from 40 to 80 years. Participants were grouped into four; A, B, C and D. Group A is the control group. They are participants who are healthy with no record of prostate disorders and inflammatory episodes. Group B are subjects diagnosed of prostatitis. While group C and group D are patients with established Benign prostatic hyperplasia (BPH) and prostate cancer respectively.

ETHICAL CONSIDERATION

The ethical approval for this research was obtained from Ethics Department of Ministry of Health Onitsha South Local Government. Informed consent was sought from participants.

COLLECTION OF SAMPLES

About 4mls of venous blood was collected through venipuncture using sterile syringe and needle in a plain tube. Blood was allowed to cloth and then centrifuged at 1000g for two minutes, then serum separated in a plain tube for PSA assay.

METHOD OF ASSAY

PSA level was determined by Enzyme-linked immunosorbent assay (ELIZA) technique by Cali biotic California USA and Mindray ELISA machine.

STATISTICAL ANALYSIS

Statistical analysis was carried out using population of mean and standard deviation. The test of significance was done using analysis of variance (ANOVA). Values were deemed significant if $P < 0.05$

RESULTS

Table 1: PSA Levels

Sample type	PSA levels (ng/ml) mean ± SD
Group A (control)	2.25 ± 0.95
Group B (Prostatitis)	2.84 ± 1.27
Group C (BPH)	14.11 ± 4.88
Group D (Prostate cancer)	19.64 ± 5.22

DISCUSSION

These investigations have apparently demonstrated that elevated prostate specific antigens (PSA) are linked to all prostate disorders. Subjects with prostatitis have higher levels of PSA compared with control group. The results of the investigations carried out presents significantly high levels of PSA in Benign prostate hyperplasia (BPH) and remarkably higher values in prostate cancer.

Therefore, PSA is an important marker in prostate disorders. It has been established that PSA is produced by both normal as well as malignant cells (Polland 2014). From our investigations more prostate specific antigens are produced by all the prostate disorders. However, there were remarkably higher values in malignant cells than in non-cancerous benign prostatic hyperplasia. Age is considered a contributing factor to higher PSA levels. It has been reported that older adults from 70years and above may have elevated PSA with no evidence of prostate disorder [7]. Normal PSA levels ranges from 0-4 ng/dl. Higher PSA levels above normal range may indicate presence of prostatitis, BPH or prostate cancer.

CONCLUSION

Prostate disorders are health challenges ravaging men 40years and above. Results from our studies indicate that PSA is an important index in diagnosis of various types of prostate disorders in males. PSA test and digital rectal examination (DRE) are good combination to differentiate prostate cancer from BPH and prostatitis. Also PSA test with magnetic resonance imaging (MRI) or prostate biopsy are good combination for differential diagnosis of prostate disorders. Early detection of prostate disorder enable prompt and accurate therapeutic treatment and management. Therefore, both screening and quatitative test for PSA are recommended for all male subjects who have attained the age of 40years and above.

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