

Evaluation of Impact of Level of Prostate Specific Antigen on Haematological Parameters of Men in Owerri, Nigeria

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Abstract

Prostate diseases are increasing at alarming rate especially with aging men in our society. Prostate specific antigen (PSA) is a serine glycoprotein secreted by prostate tissues. It is a test used to diagnose prostate disease because it is not seen in healthy persons such as prostate cancer which is usually high in them. The study was done to determine the impact of PSA level on haematological parameters of men in Owerri. A total of one hundred men aged 52-70 years were recruited for the study who came for PSA tests. They were grouped into two according the level of PSA as Group A (PSA < 4.0 ng/ml) and Group B (PSA ≥ 4.0 ng/ml). Serum blood samples were used for the PSA assay and anticoagulated EDTA venous blood used for haematological tests. The PSA was assayed using ELISA method. The results were analysed with student t-test. The results showed significant increase (P < 0.05) in haemoglobin, PCV, RBC, MCV, MCH, MCHC, lymphocyte and eosinophil of the Group A (12.9 ± 0.8 g/dl, 38.0 ± 3.2%, 4.14 ± 0.3 × 10¹²/L, 89.62 ± 10.1fl, 30.44 ± 2.1pg, 340.2 v 15.2 g/l, 53.8 ± 8.2%, 1.4 ± 0.1%) compared to Group B (9.7 ± 0.5 g/dl, 28.7 ± 2.1%, 3.3 ± 0.2 × 10¹²/L, 87.23 ± 7.2 fl, 29.4 ± 1.3pg, 337.0 ± 20.4g/l, 34.67 ± 5.6%, 1.0 ± 0.1%) and significant decrease (P < 0.05) in WBC, neutrophil and monocyte of Group A (5.06 ± 1.2 × 10⁹/L, 43.8 ± 5.0 × 10⁹/L, 1.0 ± 0.1 × 10⁹/L) compared to Group B (12.23 ± 3.1 × 10⁹/L, 63.0 ± 7.2%, 1.3 ± 0.2%). The study showed significant decrease in all the haematological parameters studied except total white cells, neutrophil and monocyte showing that the increased level of PSA has a suppressing effect on the haematological parameters. Prostate specific antigen is really a biomarker to monitor prostate disease and clinical prognosis. Haematological profile of men with prostate disease should be monitored to avoid anaemia and infections. They should eat foods

that contain antioxidants such as vegetables to reduce the free radicals and reactive oxygen released as a result of oxidative stress by the body.

Keywords: Prostate specific antigen; Haematological parameters; Owerri

Introduction

Prostate cancer is the sixth most important cancer in the world, and its incidence in blacks has been on the increase in men of 50 years and above [1]. The incidence of prostate cancer varies from country to country, with the highest incidence in the Western world and the lowest in Asia. Prostate specific antigen (PSA) is a serine protease that is immunologically specific for prostate tissue as opined by Heller [2]. Prostate specific antigen, a glycoprotein in human encoded by KLK3 gene and a member of Kallikrein-related peptidase family is secreted by the prostate epithelial cells and performs various functions during copulation and fertilization [3].

The prostate gland is a major secondary endocrine organ of males whose development and growth depends on androgen stimulation especially by dihydrotestosterone (DHT). It is shown that androgen and estrogens constitute the primary factors responsible for prostate diseases [4-6]. Aging is associated with increased accumulation of DHT which results in increased cell growth and hyperplasia [7].

Prostate specific antigen is a diagnostic tool for prostate cancer which is sometimes called a biological markers or tumour marker because it is not seen in increased level in healthy persons [8,9].

Serum PSA levels are often elevated in prostate disorders and it is a clinical markers for disease prognosis [10]. Raised levels of serum PSA may be suggestive of prostate cancer [11].

Increased level of PSA is associated with aging and overstimulation of prostate tissues as seen with highly sexually active aged men. It was shown that PSA level of more than 4.0 ng/ml is a predictive value for the diagnosis of prostate cancer [9]. This study was done to determine impact of PSA level on haematological parameters on the patients.

Aim

To determine the impact of PSA level on haematological parameters of men in Owerri.

Materials and Methods

Study area

The study was carried out in Owerri, Imo State, Southeast, Nigeria.

Subjects

A total of one hundred subjects were recruited from patients who attended St.John's Laboratory Limited, Owerri,

Table1 showing haematological parameters of the subjects.

Parameters	Group A	Group B	Significance level
Haemoglobin (g/dl)	12.9 ± 0.8	9.7 ± 0.5	P<0.05
PCV (%)	38.0 ± 3.2	28.7 ± 2.1	P<0.05
RBC (X 10 ¹² /L)	4.14 ± 0.3	3.3 ± 0.2	P<0.05
MCV (fl)	89.62 ± 10.1	87.23 ± 7.2	P<0.05
MCH (pg)	30.44 ± 2.1	29.4 ± 1.3	P<0.05
MCHC (g/l)	340.2 ± 15.2	337.0 ± 20.4	P<0.05
WBC (X 10 ⁹ /L)	5.06 ± 1.2	12.23 ± 3.1	P<0.05
Neutrophil (X 10 ⁹ /L)	43.8 ± 5.0	63.0 ± 7.2	P<0.05
Lymphocyte (X10 ⁹ /L)	53.8 ± 8.2	34.67 ± 5.6	P<0.05
Monocyte (X 10 ⁹ /L)	1.0 ± 0.1	1.3 ± 0.2	P<0.05
Eosinophil (X 10 ⁹ /L)	1.4 ± 0.1	1.0 ± 0.1	P<0.0

The results showed significant increase (P<0.05) in haemoglobin, PCV, RBC, MCV, MCH, MCHC, lymphocyte and eosinophil of the Group A (12.9 ± 0.8 g/dl, 38.0 ± 3.2%, 4.14 ± 0.3 X 10¹²/L, 89.62 ± 10.1fl, 30.44 ± 2.1pg, 340.2 ± 15.2 g/l, 53.8 ± 8.2%, 1.4 ± 0.1%) compared to Group B (9.7 ± 0.5 g/dl, 28.7 ± 2.1%, 3.3 ± 0.2 X 10¹²/L, 87.23 ± 7.2 fl, 29.4 ± 1.3pg, 337.0 ± 20.4 g/l, 34.67 ± 5.6%, 1.0 ± 0.1%) and significant decrease (P<0.05) in WBC, neutrophil and monocyte of Group A (5.06 ± 1.2 X 10⁹/L, 43.8 ± 5.0 X 10⁹/L, 1.0 ± 0.1 X 10⁹/L) compared to Group B (12.23 ± 3.1 X 10⁹/L, 63.0 ± 7.2%, 1.3 ± 0.2%).

Imo State for PSA tests. The subjects were grouped into two. The groups were:

Group A: PSA<4.0ng/ml (50 subjects) Group B: PSA ≥ 4.0 ng/ml (50 subjects)

Ethical consideration

Informed consents were obtained from the subjects before the collection of the samples and were allowed to join the study willingly.

Statistical analysis

The results were presented in Table 1 as mean and standard deviation and analysed using student t-test and significance level set at P<0.05.

Results

Discussion

The results showed significant decrease of the haematological parameters of the subjects with PSA greater than or equal to 4.0 ng/ml (Group B) compared to subjects with PSA less than 4.0 ng/ml (Group A) except WBC, neutrophil and monocyte which significant increase. This shows that increased PSA level have a suppressing effect on most of the haematological parameters studied which leads to anaemia with low survival rate if not well managed. Total white cells are increased with neutrophil and monocyte. This may induce increased cytokines leading to much pain and inflammation. This shows that increased PSA level predisposes to infection and low immunity. The increased PSA level may be associated

with genetics, environmental factors, oxidative stress and overstimulation of the prostate tissues for the highly sexually active men. Serum PSA levels are often elevated in prostate disorders such as BPH and are used as a clinical marker for disease prognosis [10]. Raised levels of serum PSA may also be suggestive of prostate cancer. The increased PSA level involves age-related hormonal alterations, metabolic syndrome and inflammation [12]. Also, several studies have shown that other processes such as chronic inflammation and increased oxidative stress may play important roles [13,14]. In addition, environment factors, especially dietary factors, may also play a role in prostate cancer incidence. The increase in prostate disorders due to dietary changes has been demonstrated in both human and animal studies [15,16]. A positive association between consumption of vegetables and decreased incidence of diseases has been well documented. This is due to the antioxidant capacity and phytochemicals such as carotenoids, ascorbate, tocopherol, flavonoids and phenolics that are present in the vegetables [17,18]. Humans are naturally protected against free radical damage by oxidative enzymes and proteins such as Superoxide Dismutase (SOD), Catalase (CAT) and glutathione as well as phytochemicals. Many plants have been identified as good sources of natural antioxidants which protect against degenerative diseases and cancer [19,20].

Conclusion

The study showed significant decrease in all the haematological parameters studied except total white cells, neutrophil and monocyte showing that the increased level of PSA has a suppressing effect on the haematological parameters. Prostate specific antigen is really a biomarker to monitor prostate disease and clinical prognosis. Haematological profile of men with prostate disease should be monitored to avoid anaemia and infections. They should eat foods that contain antioxidants such as vegetables to reduce the free radicals and reactive oxygen released as a result of oxidative stress by the body.

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