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HEMATOLOGICAL AND BIOCHEMICAL STUDIES OF PROSTATE CANCER IN HOSPITALS OF ZAGAZIG UNIVERSITY

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***ABSTRACT* : Prostate cancer is considered as the most commonly diagnosed cancer cause of death among men, reports in 2020 estimated that about 191, 930 were new cases with 33,330 expected to die of this disease. This elevating rate making it the second most commonly diagnosed cancer type in men. Early prognosis of prostate cancer can give hope for early recovery. But in clinical oncology units, diagnosis may be associated with different not specific physiological and biochemical measurements to make a decision. The aim of this study is to investigate the possible association progression of prostate cancer and the underlying metabolic and physiological changes in blood samples among Egyptian males at Zagazig University Hospitals. Fifty prostatic cancer patients treated and followed-up at clinical oncology & nuclear medicine department. Biochemical parameters including albumin, urea, creatinine were measured in blood. Results showed a statistically significant decrease of hemoglobin and RBCs count of prostate cancer cases compared to their controls (P=0.001 and 0.005) respectively, while other CBC parameters were statistically not significant between both groups (P>0.05). Other liver and kidney function tests showed no significant difference between the two studied groups (P>0.05). on the other hand, we found a significant increase in levels of ALT and AST enzymes in blood of prostate cancer patient compared with control while the levels of albumin showing no difference between patient and control. Finally, reading revealed no significant differences in the levels levels of creatinine and urea between patient and control participants. These observations declared that levels of albumin, creatinine and urea in blood could be ignored in prognosis of prostate cancer.**

KEYWORDS: **Prostate cancer, hemoglobin, RBCs count; ALT, AST.**

I.   INTRODUCTION

Worldwide, bout 1,400,000 new cases of prostate cancer are diagnosed annually; this elevating rate making it the second most commonly diagnosed cancer type in men (Sung et al., 2021). Recent reports confirming that In the United States, for example, it accounting for 27 % of cancer diagnoses (Siegel et al., 2022). The relatively low case mortality signifies that many men survive for years after their initial diagnosis with prostate cancer (Parkin et al., 2014). In Egypt, the incidence rate of diagnosed prostate cancer is 8.3 per 100000 men, representing the 5th most common cancer in males after cancer liver, bladder, Non-Hodgkin lymphoma (NHL) and lung (Curado et al., 2007). Early detection and diagnosis of prostate cancer has been facilitated through clinical digital rectal examination, serum prostate-specific antigen (PSA) monitoring represent a useful screening tools that led to low risk patients becoming 45% of localized prostate cancer cases globally (Parken, 2005).

For many years, the standard treatment for localized prostate cancer was radical prostatectomy and the usage of radiation therapy was only limited to locally advanced and elderly cases. Although, radiation therapy has provided competitive results versus radical surgery, which encouraged clinicians to use radiotherapy as a radical treatment modality to localized prostate cancer (Peshel and Colberg, 2003).

Diagnosis of latent cases of prostate cancer by serum PSA screening of asymptomatic individuals, and pathological examination of prostatectomy operations' tissues, or at autopsy was very influential on incidence rates of prostate cancer. The commercial availability of serum PSA level testing in the mid-1980s in the USA and the late 1980s in Europe, and subsequent remarkably increased usage of the test by general practitioners and urologists as an early detection and diagnostic tool led to inflated incidence rates first in the USA (Hankey et al., 1999) and few years later in Greater Europe, especially in Nordic countries (Kvale et al., 2007).

The most well-known risk factor for prostate cancer is ageing. In general, prostate cancer is rarely diagnosed before the age of 45. In most western countries, the peak in the incidence rates lies between 65 and 75 years of age (Bell et al., 2015). This underlines one of the greatest dilemmas in prostate cancer diagnostics nowadays: most men who have prostate cancer will die with the disease, not from the disease (Michał Wilk et. al. 2020). The pivotal issue of research in prostate cancer is the identification of discriminative tests that can accurately predict invalidating and lethal prostate cancer. The aim of this study is to detect the possible association between CBC criteria and the risk of prostate cancer among Egyptian patients in Zagazig, Sharkia Governorate, Egypt.

II. MATERIALS AND METHODS

Apparatus

Chromatographic analysis was performed on an Agilent Technologies (7890A) gas chromatography–mass spectrometry analysis (GC-MS) system equipped with (5975C) agilent inert XL EI MSD with Triple-Axis Detector (TAD), Inert electron ionization (EI) source with High Performance Turbo pump. Inductively coupled plasma mass (ICP – MASS) Agilent 7700 (USA). MILLIPORE direct Q -3 UV lamp and sterilized by autoclave (Raypa AES 75) at 121° for 20 minutes. The pH were measured at the sampling time by using a pH meter model HANNA HI 98190 (Rumani). Waterproof Portable Dissolved Oxygen meter (DO) (Hanna Model HI98193, Rumani), Turbidimeter (HACH Model 2100N, USA) , and Conductivity meter -Total Dissolved solids (EC/TDS SCHOTT-Glas-Mains Model CG853 P, Germany), respectively. Samples are placed in folders Ice (Ice Box) and transported to the laboratory. Water samples from different sources were collected. Sampling sites along with their coordinates are indicated as follows.

III. RESULTS AND DISCUSSION

This study was conducted in the Departments of Clinical Oncology &Nuclear and Medical Biochemistry &Molecular Biology, Faculty of Medicine, Zagazig University, in collaboration with Zoology Department, Faculty of Science, Zagazig University. Participants were arranged according to preliminary examination, into 50 healthy persons and 50 prostate cancer patients diagnosed with benign prostate hyperplasia confirmed by histopathological analysis and approved by Institute Review Board (IRB), Faculty of Medicine, Zagazig University.

Inclusion criteria of patients:
The inclusion criteria of patients included: age between 50 and 85 years, histological confirmed adenocarcinoma of the prostate without evidence of neuroendocrine or small cell differentiation, Gleason score equal to or morethan7, any stages included low volume metastatic disease, performance status between 0-2, eligible for treatment with hormonal treatment and adequate organ function.

All patients will be subjected to the following:
a. Full history taking and complete physical examination.
b.   Routine complete blood count (CBC), liver and kidney function tests.

Biochemical measurements:
10 ml venous blood was taken on EDTA-containing tube. Measurement of random blood glucose, (ALT), aspartate transaminase (AST), albumin, urea and creatinine were performed by the semi-automated chemistry analyzer (Sunostik, China) using the commercially available kits (Spin react, Spain). Complete blood count (CBC) was performed by (Bene Sphera, India).

Statistical analysis:
The obtained data were subjected to one-way ANOVA analysis by software package SPSS versions 2015 used for interactive or batched, statistical analysis, produced by SPSS Inc., it was acquired by IBM in 2009; data were expressed as mean ± S.E. The obtained data and variables were statistically analyzed using Student's (t) test (Kim 2015).

RESULTS

Fig.1 represent the age of groups studied in this study were healthy persons of age about 68.9 and patients of prostate cancer were of age 62.9 years.
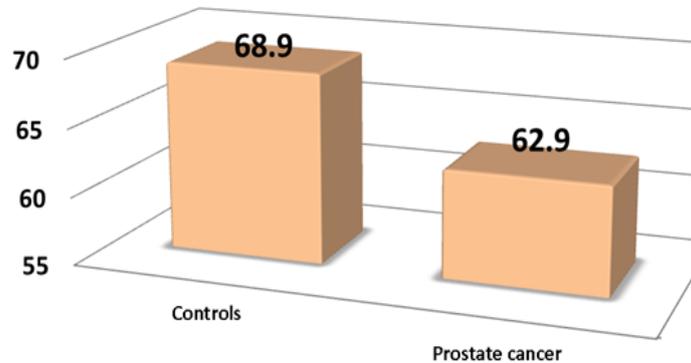

Fig. 1 prognosis of prostate cancer by age

Clinical and biochemical criteria associated with prostate cancer

There was a statistically significant decrease of hemoglobin and RBCs count of prostate cancer cases compared to their controls (P=0.001 and 0.005) respectively, while other CBC parameters were statistically not significant between both groups (P>0.05). Other liver and kidney function tests showed no significant difference between the two studied groups (P>0.05).
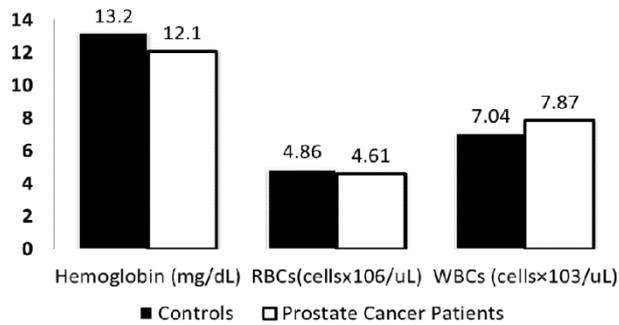

Fig. 2: level of hemoglobin and Counts of RBCs and WBCs in prostate cancer patients

Fig. 2 represent levels of liver enzymes in patients compared with healthy persons, results showing a significant increase in levels of ALT and AST enzymes in blood of prostate cancer patient compared with control while the levels of albumin showing no difference between patient and control.
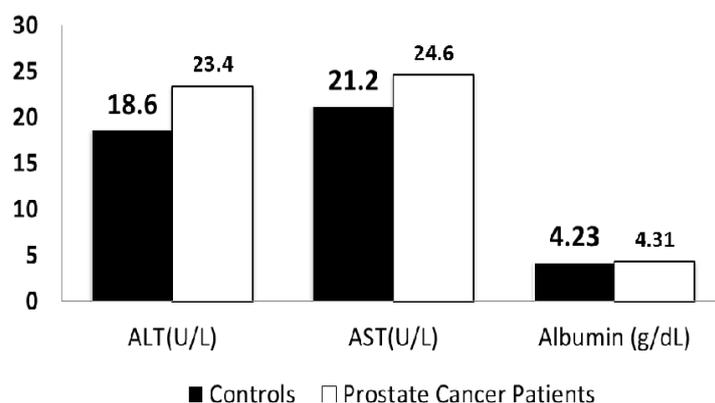
**Fig. 3 Levels of Liver enzymes ALT (U/L), AST (U/L) and albumin (g/dL)
in blood in prostate cancer patients**

Fig. 4 represents levels of creatinine and urea in blood of prostate cancer patient compared with control, reading revealed no significant differences between patient and control.
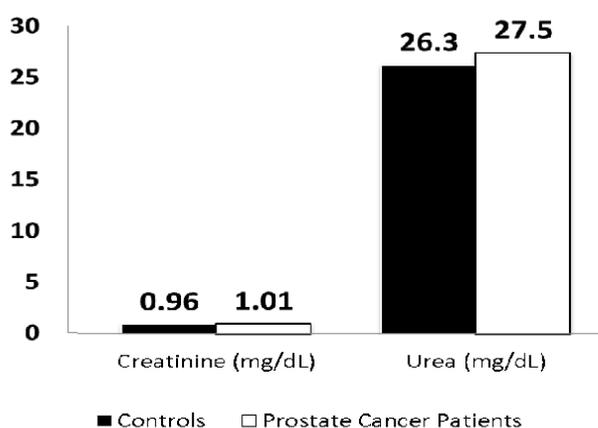

**Fig. 4 Levels of kidney function parameters; creatinine (mg/dL)
and urea (mg/dL) in blood in prostate cancer patients**

Discussion:

Prostate cancer still represents one of challenges for primary care clinicians. Many men with prostate cancer are asymptomatic until the tumor has progressed, and common symptoms have significant crossover with benign conditions affecting the prostate (Prashanth Rawla 2019). The Age is a well-established risk factor for prostate cancer. The risk for prostate cancer increases after 50-years of age and about six in ten men aged 65 and older cases present with disease (Cancer Stat Facts 2018). The disease is highly prevalent with a relatively lower mortality rate, necessitating the search for ways to identify clinically significant prostate cancer requiring invasive treatment to improve survival (Samuel Merriel, et al., 2018).

The present study showed a statistically significant decrease of hemoglobin and RBCs count of prostate cancer cases compared to their controls (P=0.001 and 0.005) respectively, while other CBC parameters were statistically not significant between both groups (P>0.05). Other liver and kidney function tests showed no significant difference between the two studied groups (P>0.05). on the other hand, we found a significant increase in levels of ALT and AST enzymes in blood of prostate cancer patient compared with control while the levels of albumin showing no difference between patient and control. Finally, reading revealed no significant differences in the levels of creatinine and urea between patient and control participants. These observations declared that levels of albumin, creatinine and urea in blood could be ignored in prognosis of prostate cancer.

There are currently no widely available tests or strategies that have strong evidence for differentiating between clinically significant and clinically insignificant prostate cancer (Lauretta et al., 2019). In the present study, two

groups of men were age-matched and showed no significant differences other than the occurrence of prostate cancer (Nunes et al. 2016).

Current diagnostic tests have limitations in terms of significant false positive and false negative rates. Research is ongoing into better methods for diagnosing prostate cancer (Samuel Merriel, et al 2018). Our study, revealed that measurements of CBC counts and levels liver enzymes albumin, urea, creatinine in blood showed a statistically significant decrease of hemoglobin and RBCs count of prostate cancer cases compared to their controls (P=0.001 and 0.005), respectively despite some studies did not show differences by race in CBC parameters predicting PC outcomes (Haddy et al. 1999 and Kulkarni et al 2009). These CBC criteria was associated with relatively no effects on liver and kidney functions (P>0.05). This observation was supported by the work of Chiong and Ribeiro which revealed that creatinine concentrations predicted advanced prostate carcinoma and decreased survival in one study (Vesalainen et al, 1995) and were elevated in patients presenting with high PSA and locally advanced or metastatic disease (Chiong et. al., 2005 and Ribeiro et. al., 1997). Elevated serum creatinine was also associated with reduced survival in a group of men with hormone-resistant prostate cancer (Fossa et. al., 1992). In other studies, significant relationships between elevated serum creatinine and disease stage, recurrence, progression, or mortality were attenuated when adjusted for other factors (e.g., age, stage, race, or PSA) (Merseburger et. al., 2001). These observations could focus the prognosis of prostate cancer mainly upon histopathological criteria and biochemical evaluation of PSA in blood.

V –CONCLUION

The early evaluation of hematological statement and biochemical changes associated with prostate carcinomas could be useful in early treatment prostate cancer patients show changes in CBC parameters and levels of liver enzymes.

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