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PROSTATE SPECIFIC ANTIGEN AS SCREENING TEST A HOSPITAL-BASED STUDY

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ABSTRACT : Prostate specific-antigen (PSA) as a biochemical marker (FDA approved) was used for early detection and monitoring of prostate cancer for males. Because of the low incidence of prostate cancer in Arab males 3 per 100000, a hospital-based study was chosen rather than a community-based study to assess the value of PSA in the diagnosis of prostatic disease in Iraqi males. This study included 163 males with ages ranged from 50 to 86 years old and subdivided into four groups. Blood samples were taken from each male and PSA measurements were done using immunometric technique assay based on chemiluminescence method by Roche company model E411. The obtained results revealed a significant difference between (50 – 55) years age group and (56 -60) years age group with P-value ≤ 0.05. Also, there is a significant difference between (61 -65) years and the group of more than 65 years in age with p-value difference between (50 – 55) years age group and (56 -60) years age group with P-value ≤ 0.05. Also, there is a sixamined persons had a normal PSA level according to the age. While about 70% of patients had high level of PSA that needed further investigations. Moreover, the results indicated a positive correlation between age and PSA value (r = +0.195), P ≤ 0.01, which means the chance to get prostate cancer increased when age is increased. From the above data using PSA as a biochemical marker for prostate disease, a hospital-based study is valuable because about 70% of patients had abnormal levels and need further investigations. Also screening tests for (45-49) years age group is recommended.

Key words : PSA, prostate cancer, age specific PSA, reference range.

INTRODUCTION

Screening for early detections of prostate cancer is mainly relaying on the digital rectal exam for many of years ago. At that time, most cases of cancer were diagnosed in an advanced stage that has no influence on reductions of mortality rate (Horner *et al*, 2017). The prostatic specific antigen (PSA) was detected by Ablin (1970). Later on, PSA was proved to have an important marker in prostatic pathology (Ablin, 2000). Measurement of serum PSA is a valuable tool to identify prostate cancer when the value is more than 10 ng /ml. Prostate volume is non-significant for the diagnosis of prostatic diseases. PSA is an organ-specific, but isn't a disease-specific that can be identified in benign prostatic hyperplasia (BPH), normal prostate and prostate cancer, whether primary or metastatic (Placer and Morote, 2011). The upper normal value of PSA was estimated to be 4 ng/ml; however, this is not applied to all patients. Globally, PSA should be adjusted to geographically and ethnicity. Also, age-specific reference range for the marker first introduced from community base populations from healthy white American males (Modlin, 2012; Zhang *et al*, 2017). Because of the low incidence of prostate cancer in Arab males 3 per 100000 compared with US males 147.8 per 100000, hospital-based study was chosen rather than community base to assess the value of PSA in the diagnosis of prostatic diseases in Iraqi males and to adopt a program for patients with lower urinary tract symptoms that are attending urology as well as non-urological clinics. (Bener *et al*, 2008; National Cancer Institute, 2015).

MATERIALS AND METHODS

The present data were collected in the Iraqi center of cancer and medical genetics research for referred patients from urology center and non-urology clinics during Febuary 2019 until November 2019. Exclusion criteria have no active urinary tract infection, have no ejaculation within 24 hours had no digital rectal exam for one week, and lastly had no prostate biopsy in the last 6 weeks.

The referred patients included 163 males with ages ranged from 50 years to 86 years. Blood was taken from each individual included in this study for doing PSA test

using immunometric technique assay based on chemiluminescence method by Roche company model E411. Samples were analyzed in the same laboratory in order to overcome the variation in measurements. The internal quality control program was obeyed after calibration with a mean ± SD.

Statistical analysis

The acquired date were analyzed using SPSS V. 24, (IBM USA) software. Student t test with P-value ≤ 0.05 was used for data analysis, Pearson's correlation test was done to find the correlation between the interests of the study (PSA) with patients age.

RESULTS

The (163) patients were divided in to four age groups (50 - 55) years (D), (56 - 60) years (C), (61-65) years (B) and 66 years and more (A). Includes 53 patients, 37 patients, 36 patients and 37 patients, respectively. Unfortunately, in this study we don't have any patient below 50 years' age (Table 1).

As presented in Table 2, there is a significant difference in PSA value between the age group D and (A) ($p \leq 0.05$). Also, a significant difference wasindicated between the group (B) and the age group of (C). atp-value of 0.01. However, a non-significant difference was noticed between the age-group of A and the age-group (C) years. (P-value 0.45). Furthermore, a non-significant difference seen between the age-group of A and the age-group (B) years with p-value of 0.08.

As seen in Table 3, normal value was adjusted for PSA according to age. The prediction linear regression equation PSA = 0.37 + 0.02 x age (Hailan and Rifat, 2011).

Ordinary least square method: Early diagnosis of prostatic cancer investigated age-specific PSA cutoff values in Arab populations. Using lower cutoff values for PSA may detect prostate cancer while still in the curable state. It's especially important to lower cutoff value of PSA in the younger age group 40-49 years because this age group has lower incidence of BPH.

Additionally, this study was focusing on finding if there is any correlation between PSA value with patients age and the outcomes revealed that there is a moderated positive correlation (r = + 0.195) p- value = 0.014 as shown in Table 4.

Table 1 : The study group (patients) according to the age.

Group	Patients age	No. of patients
A	66 ≥	37
B	61-65	36
C	56-60	33
D	50-55	53
Total		**163**

Table 2 : Estimated PSA value for the studied sub groups (A,B,C,D).

Group	Parameters	Mean ± SD
A	PSA	13.08 ± 29.4
B	PSA	3.8 ± 2.9
C	PSA	9.1 ± 11.1
D	PSA	5.09 ± 5.05

Table 3 : Illustration of normal and abnormal PSA value according to age.

Group	Normal Value (%)	Abnormal value (%)
A	15 (40.5%)	22 (59.5%)
B	15 (41.7%)	21 (58.3%)
C	9 (24%)	28 (76%)
D	11 (20%)	42 (80%)
Total = 163	n = 50	n = 113

Table 4 : Patients age and the outcomes revealed that there is a moderated positive correlation (r = + 0.195) p- value = 0.014

Parameter	Correlation coefficient (r)	p-value
PSA	+0.195	0.014

DISCUSSION

In this research, a hospital-based study was chosen rather than population-based research, this is due to the prostate cancer in Iraq is considered fourth cancer in men after lung, bladder, and larynx (IARC, WHO, 2018).

Populations based-screening program will not be effectively cost program in Iraq, as shown in Table 3, about 30% of all examined patients having normal PSA levels. From the data obtained from the current study, a hospital-based early detection program is more suitable and cost-effective and improves the clinical result in comparison to population-based programs (Oliveira *et al*, 2018; Carrara's *et al*, 2013; Fadhel *et al*, 2018; Asaad *et al*, 2018).

Further studies on a greater scale are indicated. Moreover, those patients who are at higher risk (family history with positive prostate cancer) should screen at 40-49 years, which is having a high chance to indicate (Bibbins-Domingo *et al*, 2017; Hekal, 2009).

The increased consciousness of the general population concerning prostatic cancer is essential. Participation in this early detection program will depend mostly on knowledge level and quality of information given to the patients and their families. This is an approach will depend on the solid background of suitable information and motivation from physicians(Fadhel *et al*, 2018; Arafa *et al*, 2017). An extensive multicentric report from different hospitals in Iraq is essential to give valued data

and real prostate cancer epidemiology. Hoping that this research will provoke other studies.

In spite of the low incidence of prostate cancer in the Arab region, the disease has been on the rise. Arabic males with level of PSA more than 10 ng/ml is more likely to have BPH in comparison with Americans, and European men with similar level had a higher risk of developing prostatic cancer (Queem *et al*, 2013; Heidenrich *et al*, 2014). Prostate cancer is prevalent in PSA patients ranged from 4 to 10 ng/ml (25% of men), while 25% of prostate cancer patients have below 4 ng/ml a PSA level. Moreover, in Egyptian study in 20012 showed prostate cancer in men below 50 years with PSA level below 4 ng/ml. They recommended a serum PSA cutoff level of 2 ng/ml for men below 50 years old. Also, screening in these age group men is more likely to detect curable cancer; moreover, this age group is less likely to have medical Comorbidity and can undergo radical surgery (Bassam *et al*, 2019; Arafa *et al*, 2012). For males below 55-years old at greater risk like a positive family history of prostate cancer and decision for screening must be individualized. The present data had limitations such as small size, shortage of information of each patient included in this study (*e.g* definite diagnosis of carcinoma, benign prostatic hypertrophy etc). Moreover, the ratio of free/total PSA, prostate volume was not estimated. For that reason, screening hospital-based the program appeared to be more suitable measures to diagnose the disease at early curable stages and to improve clinical outcomes as compared to population-based program. It is clear that the incidence of this disease is increasing, and the western lifestyle in our society (environmental factor) could play a crucial role.

Further study to 45-49 year's age group to examine for PSA levels. The study conducted on a large scale and included multi-centered.

CONCLUSION AND RECOMMENDATIONS

From the above data using PSA as biochemical marker for prostate disease a hospital based study is valuable because about 70% of patients had abnormal levels and need further investigations. Also, the results indicated a chance of getting prostate cancer increased as the age of the patients increased. Additionally, screening tests for 45-49 year's age group is recommended.

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