

Effects Of Obesity On The Serum Levels Of Free And Total Prostate-Specific Antigen In A Sample Of Iraqi Men.

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Abstract: *Objectives: the study aims to assess the relationship between obesity and prostatic markers (total prostatic specific antigen (tPSA), and free prostatic specific antigen (fPSA)). Methods: this study was conducted on 127 men aged ≥ 40 years at The Department of Urology at Al-Ramadi Teaching Hospital. Exclusion criteria were a history of previously diagnosed or treated prostate cancer, the use of prostacare or any drugs that affect the levels of PSA in the serum. Results: the age range of the participants of the study was between 40–80 year. The number of men with normal BMI was 26 (20.47%), 47 men were overweight (37%), 33 men were obese (25.98%), and finally, 21 men were severely obese (16.53%). The mean of parameters total and free prostate-specific antigen (tPSA, fPSA), in the study, were (mean \pm SD) (1.683 \pm 0.563) ng/ml, (0.537 \pm 0.189) ng/ml, respectively. Conclusions: there are no significant relationships between BMI, tPSA, and fPSA, at $P \leq 0.05$ in a sample of Iraqi men.*

Keywords: BMI, Obesity, PSA, Prostate, Metabolic syndrome

1. INTRODUCTION

Metabolic syndrome (MS) is a complex of disorders relating to metabolic abnormality, central obesity, including hypertension, dyslipidemia, insulin resistance with compensatory hyperinsulinemia, and impaired glucose metabolism that rising risk of diabetes type II, and cardiovascular disease with the core of MS lies in the group or collection of these metabolic risk factors^{1, 2}. At the biochemical and molecular levels, several systemic disorders linked with MS, composing the systemic proinflammatory case, sex steroids variations, autonomic hyperactivity, have been implicated in the development of BPH and high insulin-like growth factor^{3}

The incidence of obesity has increased from 1 in six adults to 1 in three adults in the last two decades^{4}. In Iraq, there is no figure available, but one study conducted in Baghdad in 1997 showed that the prevalence ratio of obesity was 23.16% in aged 25 years old and above^{5}. Indeed, obesity is considered as the main risk factor to develop deleterious associated pathologies as liver diseases, type II diabetes, prostate cancer, and coronary heart diseases^{6}. Prostate-specific antigen (PSA) is a commonly used tumour marker in the screening of prostate cancer^{7}. There are several mechanisms most commonly proposed to explain the association between obesity and prostate cancer (PCa) and other prostate diseases, which are the insulin/insulin-like growth factor (IGF)-1 axis, decreased serum testosterone and peripheral aromatization of androgen, and adipokine signalling caused by inflammation^{8}.

As mentioned by other studies there is a link between sex hormones and prostate growth^{9}. Several studies showed that a BMI ≥ 40 kg/m² was linked with a more than 50% increase in cancer death-rate across a wide range of malignancies, including PCa^{10}.

Serum PSA can be measured in two types, either total conjugated (conjugated to other proteins) or free PSA (non-conjugated). The percentage of free PSA tends to increase in benign prostatic hypertrophy compared with prostate cancer, and the increasing size of the prostate correlates with an increase in the percentage of free PSA^{11}.

This study aims to assess the relationship between obesity and prostatic markers (total prostatic specific antigen (tPSA), and free prostatic specific antigen (fPSA)).

2. MATERIALS AND METHODS

This study was done in western Iraq-Anbar province on 127 men aged from 40 to 80 year. The samples were taken from the Department of Urology at Al-Ramadi teaching hospital. After taking informed consent from participants, the data of the study was obtained by filling a questionnaire (Supplementary Appendix 1), and the collection of 10 ml blood. Weight and height (with their clothing and without shoes) were also recorded for the participants. Serum was separated then transferred to the research laboratory. Serum samples were divided into five aliquotes and stored at -20 °C until assayed. Exclusion criteria were history of previously diagnosed or treated prostate cancer, the use of prostacare or any drugs that effect on PSA and patients with serum PSA ≥ 5 ng/mL. The BMI was calculated by measuring the weight and height, according to the following equation^{12}

$$\text{Body Mass Index (BMI)} = \frac{\text{Wight (kg)}}{\text{Height (m)}^2} \text{ Kg/m}^2$$

The men participated in this study were classified into four BMI groups according to the WHO BMI classification^{13}, that includes: Normal BMI (18.5–24.9), overweight (25–29.9), obese (30–34.9), and severe obesity (35–39.9).

Serum tPSA, and fPSA was measured by using tPSA and fPSA utilizing ELISA technique, Manufactured by Bioactive (Germany)^{14}, and Monobind (USA)^{15} company respectively.

3. RESULTS

The age range of the participants of the study was between 40–80 year. The number of men with normal BMI was 26 (20.47%), 47 men were overweight (37%), 33 men were obese (25.98%), and finally, 21 men were severely obese (16.53%).

Table 1 shows the relationship between the BMI, tPSA and fPSA. There is no significant relationship between BMI and the levels of tPSA, and fPSA at $P \leq 0.05$, in the men who participated in this study. Figure 1 and 2 represent scatter charts for all the men understudy, showing the non-significant negative correlation between BMI and both tPSA, fPSA at $P \leq 0.05$.

Table 1- Relationship between BMI, tPSA and fPSA in a sample of Iraqi men at P≤0.05				
Body Mass Index (BMI)				
Parameters	Normal BMI (1)	Overweight (2)	Obese (3)	Severe Obesity (4)
tPSA (ng/ml)	a*	a	a	a
Range	1.30-2.80	1.12-3.40	1.15-3.10	1.15-2.20
(Mean ± SD)	1.759±0.425	1.729±0.649	1.707±0.628	1.451±0.319
fPSA (ng/ml)	a	a	a	a
Range	0.36-0.75	0.36-1.50	0.35-1.00	0.37-0.70
(Mean ± SD)	0.528±0.103	0.557±0.250	0.557±0.181	0.470±0.095

* = significance at P≤0.05

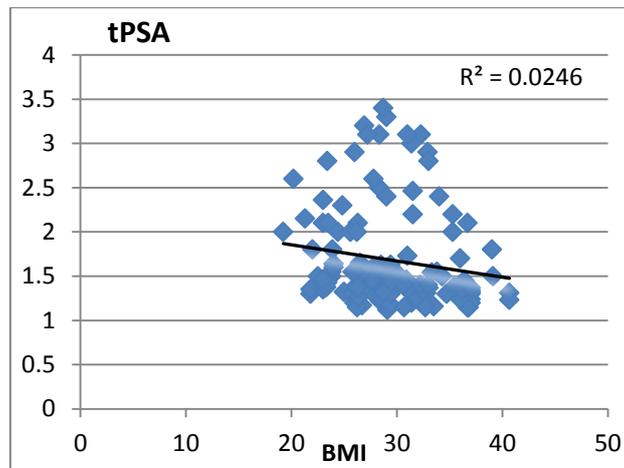


Figure 1: a scatter chart showing the non-significant negative correlation between serum tPSA and BMI in men under study

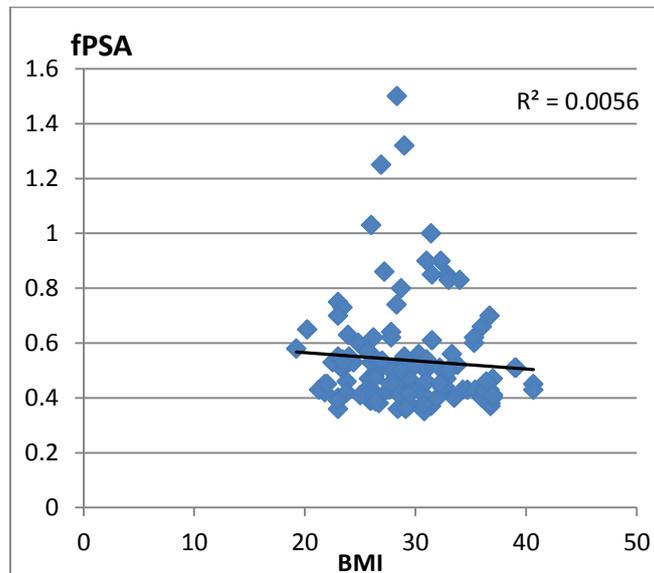


Figure 2: a scatter chart showing the non-significant negative correlation between serum fPSA and BMI in men under study

4. DISCUSSION:

These study findings showed that PSA levels were decreased non-significantly in a sample of Iraqi men with increased BMI at ($P \leq 0.05$). The levels of tPSA in normal BMI, overweight, obese, and severe obesity was (1.759 ± 0.425), (1.729 ± 0.649), (1.707 ± 0.628), and (1.451 ± 0.319) (ng/ml) respectively, which is identical to the results of Mariko et; al., 2012 study^{16}. Our study also in agreement with the results of Elrifai A et; al., 2016^{17} that found higher BMI was significantly associated with a lower serum PSA in Egyptian men. Also in a study done by Hekal et; al., 2010^{18} found an inverse relationship of obesity to PSA. Our studies are not identical with the results of Meng-Bo Hu et, al.,2015 study^{19}.

The level of fPSA has not changed with increased BMI in normal BMI, overweight, and obese, but there are non-significant decreased in men with severe obesity, their levels were in 4 groups were (0.528 ± 0.103), (0.557 ± 0.250), (0.557 ± 0.181), and (0.470 ± 0.095) (ng/ml), respectively, this is consistent with the results of Meng-Bo Hu et, al.,2015^{19}. In contrast, Loeb et. al. 2007^{20} found that total PSA increased with high BMI in a sample of men who underwent radical prostatectomy (RP). Usually increased BMI is linked with a decrease in PSA levels^{{21}{22}}; therefore some studies have decided that obesity is preventive against prostate cancer. It is still unclear whether this is a correct protective effect or simply the result of more “diluted” PSA caused by the greater volume of sera and fluids present in bodies of obese men^{23}. On the other hands, some studies reported that both race and obesity can be used to predict more aggressive prostate cancer at biopsy^{24}. The higher presence of adipose tissue may also increase serum estrogen hormone levels which may lower the expression of PSA^{23}.

5. CONCLUSIONS

The PSA level was influenced by BMI after adjusting age. The lower PSA level may be induced by lower serum testosterone milieu in obese men and larger volume of body fluid in the latter as a result of hemodilution. Therefore, PSA test results must be carefully interpreted especially for men with obesity, in whom a substantial reduction in PSA concentration is likely to occur. Because of a strong association between age and PSA levels, age-specific PSA threshold is widely used for PSA screening in clinical practice. Likewise, the development of modified PSA thresholds for obese men would be awaited to provide greater accuracy for PSA tests.

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Appendicies

Supplementary Appendix 1, Questionnaire of the study.

Name		Age years	
Contact		Address	
Weight Kg		BMI	
Height Cm			
Prostate size		Alcoholic	
If it found		Smoking	
MEDICAL HISTORY			
Prostate diseases			
Heart disease			
Diabetic			
Other diseases			
Treatments & Drugs that he used			
Surgical operations			

Family history of the disease	
Others	