# The role of Selenium Trace Element in Iraqi Patients with Prostate Tumors

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### Abstract

To study and evaluate the effect of selenium and its relationship with prostate tumors, one hundred samples were taken for the study, including 60 patients with prostate cancer and 40 healthy subjects from Iraqi men. The levels of the serum selenium were measured in the samples of infected men with prostate tumor and healthy subjects, after the samples were drawn from the study cases. Flameless Atomic Absorption used for measuring. The data were statistically analyzed by SPSS. Also prostate specific antegene (PSA) was measured as an indicator of prostate tumor. The results showed that there was a significant difference between patients with prostate tumor and selenium trace element, which was observed in malignantprostatecancer patients ( $4.27 \pm 0.93$ ), benign prostate cancer patients ( $6.12 \pm 0.54$ ) and healthy ( $9.30 \pm 1.72$ )) When comparing study groups, according to the severity of prostate disease in men The study recommends to provide adequate support and guidance for them and give selenium to men after the age of 45 years.

Keywords: prostate tumors, selenium, risk factors and role.

#### الخلاصة

لدراسة و تقييم تأثير العنصر النزر سيلينيوم وعلاقتها مع آورام البروستات, تم اخذ 100 عينة للدراسة, منها 60 مرضية من مرضى مصابين بمرض ورم البروستات و40 من الاصحاء من العراقيين وتم قياس مستويات العنصر النزر سيلينيوم في مصول العينات من الرجال الاصحاء والمصابين بمرض ورم البروستات, بعد تهيئة العينات المسحوبة من قبل حالات الدراسة تم القياس بطريقة الامتصاص الذري(flameless atomic absorption techniques ) تم تحليل البيانات احصائيا بواسطة النظام الاحصائي(SPSS).وكذلك تم قياس الانتجين الخاص للبروستات ( PSA )كعامل تشخيص لاور ام البروستات. الخبيث النتائج انه يوجد قيمة معنوية بين مرض ورم البروستات وعنصر السيلينيوم وظهرت في مرضى سرطان البروستات الخبيث (4.27±0.93) وفي مرضى ورم البروستات الحميد (0.54±0.54) وفي الاصحاء (1.72±9.90) وجدت الدراسة ارتفاع معنوي عالي (P< 0.01 (HS) عند المقارنة بين مجموعات الدراسة. و لخطورة مرض البروستات عند الرجال توصي الدراسة إلى التأكيد على ضرورة توفير الدعم والإرشاد الكافي لهم وإعطاء السيلينيوم للرجال بعد عمر 45 سنة.

#### 1. Introduction

The prostate is a gland found only in males. It is located in front of the rectum and below the urinary bladder. The size of the prostate varies with age. In younger men, it is about the size of a walnut, but it can be much larger in older men. The prostate's function is to make some of the fluid that protects and nourishes sperm cells in semen, making the semen more liquid. [1]Prostate cancer remains one of the most common cancers afflicting men today. It is the third most common cancer in the world and the second cause of cancer death in men in Western countries [2].Rates of detection of prostate cancers vary widely across the world, with Asia detecting less frequently than in Europe, and especially the United States [3].

Prostate cancer incidence and mortality rates are increasing in some Asian and European countries [4]. In 2005, a total of 34,302 men in United Kingdom (UK) were diagnosed with prostate cancer, and, in 2006, 10,038 men died from the disease [5]. With lifestyle changes, the incidence of the disease has been increasing in Arab population [6].

From 1991-2006, prostate cancer was ranked first among cancers in Qatari males over 65 years old [7]. In Kuwait, the incidence of prostate cancer rose to 12.3/100,000 men /year in 2004 [8]. In 2003, prostate cancer was ranked as the fourth most diagnosed cancer in Tunisia [9]. In Lebanon, the incidence of prostate cancer was 21.5/100,000 men /year in 1998 [10]. In Iraq, cancer of prostate is leading cause cancer in males accounting for 3.3% of the newly diagnosed cases [11]. Several factors, including age, race, family history, hormone levels, and environmental influences are suspected to play a role in pathogenesis [12].Burford*et al.*, 2009, referred to that prostate-specific antigen (PSA) is a glycoprotein responsible for liquefying semen and allowing sperm to swim freely. It is expressed in both benign and malignant processes involving epithelial cells of the prostate. In condition of alteration in the architecture of the prostate in conditions such as prostatitis and BPH as well as prostate cancer, PSA leaks out, leading to increased levels in the bloodstream. Over many years the Gleason system has been shown to be a powerful predictor of prostate cancer behavior, and because of the histological variation within each tumor, two grades, the predominant, or primary, grade and the less extensive, or secondary grade, were recorded as the Gleason sum score in each case [13].

#### **Trace elements**

The term trace elements refer to chemical elements present in a natural material at very small amounts. In analytical chemistry, a trace element is an element in a sample that has an average concentration of <100 parts per million (ppm) measured in atomic count or <100  $\mu$ g/g. In biochemistry, a trace element is a dietary mineral that is needed in very minute quantities for the proper growth, development, and physiology of the organism [14].

Trace elements have several important roles in human bodies, some are essential for enzymes reactions where they attract and facilitate conversion of substrate molecules to specific end products. Moreover, some of them donate or accept electrons in redox reactions that are of primary importance in the generation and utilization of metabolic energy. Some of them have structural roles and responsible for the stability of important biological molecules. Furthermore, some trace elements have important actions throughout biological processes [15]. In fact, although the trace elements are essential components of biological activities, the excessive levels of these elements can be toxic for the body health and may lead to many fatal diseases, such as cancers. In this review article, we will describe the properties and biological important of a Selenium trace element.

#### Selenium (Se)

Selenium is a chemical element with symbol Se and atomic number 34 and has an atomic weight of 78.97. Se is an essential micronutrient. The selenium content in the human body is about 13-20 mg. It is a vital mineral with an established RDA approximately 70  $\mu$ g/day. The best food sources for selenium are seafood, meats, whole grains, and some vegetables. [16-17].

Se is a vital trace element for human body health, where it is found at the active site of a wide range of selenoproteins as selenocysteine. It is an important component of the antioxidant enzymes such as glutathione peroxides and thioredoxinreductase[18].Although selenium deficiency is rare in healthy human, it is a very toxic if taken in excess amounts. It has been established that dietary selenium is important for a healthy immune system, where it enhances T-lymphocyte immune responses. It has been found that there is a relationship between low blood levels of Se and increased cardiovascular disease mortality. Furthermore, it has been reported that the lack of selenium is the main reason of Keshan disease. On other hand, there is strong evidence that Se has a protective effect against some forms of cancer such as colon, prostate, and breast [19-20].

#### 2-Materialand methods

This prospective study was conducted at two main medical facilities in Baghdad: The medical city Detection of Tumors/Oncology Teaching Hospital and poisoning consultation center/specialized surgeries hospital Early Detection 2018 at A total of 100 subjects were enrolled in this study and divided into twogroups. The first group included 60 patients men aged upper 45 years. The second group included 40 healthy men that have normal prostate tissue and without any previous history of any systemic diseases. Selenium element estimated for all cases by using theGrafite Furnace Atomic Absorption instrument that performs flame and flame less. In most of the electro thermal techniques, few micro liters of the sample are placed in the electrothermal atomizer which is made of pure grafite or tantalum or carbon because of their high fusion degree reaching more than  $(3000c^{0})$ .

Data were analysed using SPSS-18.data of twogroups was compared by the student's T-test;p >0.05 was taken as non-significant, p<0.05 was taken as significant and p<0.01 was taken as significant ishighly.

## **3-Results**

Table (1) is expressed as mean  $\pm$  SD and represented the mean value of serum Selenium in patient control and study groups .The results appeared a decrees significant in the mean serum Selenium level of the study (malignant and benign) group (4.27 $\pm$ 0.93 µg/dl), (6.12 $\pm$ 0.54 µg/dl) respectively compared to that of control group (9.30 $\pm$ 1.72 µg/dl), respectively (p >0.05). And showed increased in mean serum PSA of study group (68.80 $\pm$ 40.64ng/ml) and (10.03 $\pm$ 4.15 ng/ml) compared to that of control group (1.63 $\pm$ 1.05ng/ml) (p <0.05). (Se=selinum ,HS=high significant ,NS=non-significant , n= number of sample).

	Groups	Ν	Mean± SD.	t-test	P-Value	(C.S)
PSA	Control	40	$1.63 \pm 1.05$			
	malignant	27	68.80±40.64	10.487	0.000	P< 0.01 (HS)
	Benign	33	10.03±4.15	12.374	0.000	P< 0.01 (HS)
SE	Control	40	9.30±1.72			
	malignant	27	4.27±0.93	16.371	0.000	P< 0.01 (HS)
	Benign	33	6.12±0.54	10.212	0.000	P< 0.01 (HS)

Table (1): Comparison of (Mean $\pm$  SD.) of serum Selenium concentration ( $\mu$ g/dl) and serum PSA (ng/mg) of study and control group.



Figure (1): Observed and linear Regression when Se decrease PSA increase in patients with prostate tumors.

#### **4-Discussion**

There are numerous studies have recorded risk of prostate cancer, Serum prostate specific antigen (PSA) and selenium levels in patients diagnosed with prostate carcinoma and compared with those without prostate cancer as controls came intofocus in this study. The effect of age on the risk of prostate cancer was also investigated. The study shows that the meanvalues of prostate specific antigen (PSA) for patient's wereabove the normal range, while the mean values of serum selenium was below or lower than the normal range [21]. Similarly a comparative analysis of serumselenium concentrations in patients diagnosed with prostate cancer and control subjects showed that the selenium levelof patients were significantly (p<0.05) lower than that of the control subjects which agrees with the works of Brooks [22].

The result of the present study is therefore inagreement with previous studies on the subject and indicates that serum prostate specific antigen (PSA) and selenium levels are reliable indicators for prostate cancer assessmentand evaluation in suspected individuals.

Essential elements are recognized as important constituents of biochemical reactions which have a complex role indevelopment and inhibition of chronic disease such as cancer. These effects may show itself in very different toxicological process. However, the most proposed mechanism relationshipbetween essential element and cancer comes from the deficiency of essential elements which may cause the failure of antioxidant defense and emerging of oxidative stress. Seessential components of metalloenzymes and they are important inintra-and extra cellular antioxidant defense [23].Zn and Se are required for a healthy prostate, Cd shows toxic and carcinogenic effects [24].also found that Se and Zn levels were significantly lower, and the concentrations of Co and Cu were higher (p<0.001) in patients with PCa (20 subjects) than in controls (21 healthy individuals). They observed the levels of Fe were not significantly different in PCa patients in comparison to controls (p>0.05) [25].

In this study, lower levels of Se was found in PCa patients compared to control subjects agreement with study [26] that found serum Selenium is low in patient with prostate cancer in comparing to healthy individual.

Some evidence demonstrated that Se can prevent thedevelopment of many types of cancer, including prostate cancer [27]. Supplementing dietary Se intake has been theaim of few clinical trials in cancer development. Also agree with Nozawa the mean serum Se level inthe 62 PCa patients and 68 controls show low of selenium in PCA patient, respectively (P=0.002), consequently serum Se levels in PCa cases were lower thanin controls and they suggest that Se may protect againstPCa. Nozawa et al [28].

From the above data, it can be concluded thatthe mean levels of all the selected trace element Selenium, showed a highly significant difference in the serum of malignant & benign prostate cancer men compared to healthy control men. These results concluded that the alteration in trace elements metabolism may be related to the development and even progress of prostate cancer among men.Also according to the results of the present study, Statically Selenium (Se) trace element and Prostate specific antigen (PSA) marker are the best indicators for prostate tumors. The study recommends emphasizing the necessity of cooperation between the Ministry of Health and the Ministry of Commerce and protecting them from dangerous behavior by providing them with sufficient support and guidance to take and estimating trace elements and focusing on the extension programs in the protection of the community through educating them with the guidance programs.

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