

## Determination of serum zinc concentration in normal healthy men & type II diabetes mellitus patients.

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### Abstract

Body zinc content is regulated by the homeostatic mechanism, which regulate zinc absorption and excretion depending on its body requirements. The function of cells and tissues enzymes is depend zinc content & over 70 human body enzymes with which zinc is associated. Pervious studies show that some trace elements like magnesium, zinc, manganese & selenium may play important role in action of insulin hormone, including activation of insulin receptor sites. The aim of the study is to determine the serum level of zinc in normal healthy men & diabetes mellitus type II patients. A cross sectional study was done in Tikrit teaching hospital from beginning of January to end of December 2010. The study conducted on 50 type 2 diabetic male patients was participated in the study. While, 30 normal healthy men age matched (aged 55 to 60 years) were included as a control. Serum zinc was measured for control healthy non diabetic subjects & diabetic type 2 patients. There were non significant differences regarding age. However there is significant increase in BMI of diabetic patients as compare with control men. Fasting serum glucose was significantly higher in DM patients as compare with control subjects. Moreover, there is significant reduction in serum zinc in diabetic patients ( $89.35 \pm 19.23 \mu\text{g/dl}$ ) as compare with normal health subjects ( $135 \pm 35.18 \mu\text{g/dl}$ ). In diabetic patients, there is significant negative correlation between fasting blood sugar & serum zinc ( $r = -0.37$ ). In present study conclude that there is a significant reduction in serum zinc in diabetic patients. The present study recommend that diabetic type II patients should be encourage to eat diet rich in zinc or take zinc supplement.

*Key words: DM, BMI, fasting blood sugar & serum zinc.*

### تعين تركيز الخارصين في مصل دم الرجال السليمين و المصابين بداء السكر النوع الثاني

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#### المخلص

محتوى الزنك في الجسم ينضم بواسطة آلية التوازن الداخلي ، و الذي ينضم امتصاص و إفراز الخارصين اعتمادا على احتياجات الجسم . إن وظيفه إنزيمات خلايا الجسم تع تمد على محتوى الخارصين و إن أكثر من سبعين إنزيم تعتمد على مستوى الخارصين. الدراسات السابقة أظهرت إن بعض العناصر النزرة كالمغنيسيوم و الزنك، المنغنيز، السليوم قد تلعب دورا مهما في عمل هرمون الأنسولين. تهدف الدراسة لتعيين تركيز الزنك في

مصل دم المصابين بداء السكر النوع الثاني مقارنة مع الأشخاص السليمين. دراسة مقطعية أنجزت في مستشفى تكريت التعليمي من بداية كانون الثاني لغاية كانون الأول 2010. تطوع في الدراسة 50 مريض مصابين بداء السكر النوع الثاني وقورنت مع 30 شخص سليم كسيطرة و بأعمار تتراوح بين 55 إلى 60 سنة. هنالك زيادة معنوية في تركيز سكر الدم في مرضى داء السكر النوع الثاني مقارنة مع السيطرة. و هنالك نقصان معنوي في تركيز الخارصين في مصل دم المرضى المصابين بداء السكر مقارنة مع السيطرة. تلخص الدراسة الحالية بلن هنالك نقصان معنوي في تركيز الخارصين في مصل دم المصابين بداء السكر. و توصي الدراسة الحالية بتشجيع مرضى داء السكر بتناول الأغذية الحاوية و الغنية بالخارصين.

## **Introduction**

Zinc is an essential trace element in human body. Body zinc contents are regulated by the homeostatic mechanism (1-2), which regulate zinc absorption and excretion depending on its body requirements (3-4). Absorption of zinc in small intestine is decreased by fibers, phosphate, calcium, and copper whereas increased by glucose, amino acid, and peptides (5). Most zinc in the circulation is bound to albumin (6). The function of zinc in cells and tissues depend on those of the metalloproteins and enzymes (over 70 human enzyme systems) with which zinc is associated. Body systems that influenced by zinc include the reproductive, neurological, immune, skin, and gastrointestinal tract (7-8). Previous studies stated that trace element concentrations are different in serum & urine of diabetic patients. Diabetes type II comprises 90% of people with diabetes around the world & it is largely the result of excess body weight & physical inactivity (9-10). Diabetes mellitus is a chronic disorder of carbohydrates & lipid metabolism. There is defective or deficient insulin secretion, which leads to impaired carbohydrate metabolism, (11). Pervious studies show that some trace elements like magnesium, zinc, manganese, molybdenum & selenium may play important role in action of insulin hormone, including activation of insulin receptor sites, (11-13). The aim of the study is to determine the serum level of zinc in normal healthy men & diabetes mellitus type II patients.

## **Patients & methods**

A cross sectional study was done in Tikrit teaching hospital from beginning of January to end of December 2010. The study conducted on 50 diabetic type 2 male patients was participated in the study. Also 30 normal healthy male subjects age matched (aged 55 to 60 years) were included as a control. The followings patients were exclude from the study; diabetic patients who had been treated with insulin; hypertensive patients, patients who had taken diuretics; subjects who had acute complications such as severe infection, trauma & patients with sever ketoacidosis. Body weight & height were measured & body mass index (BMI) was calculated from body weight in Kg divided by height square in meter. Fasting venous blood samples were taken after overnight fast (8-10 hours) from all subjects. The blood samples were centrifuged at 2000 rpm for 10 minutes & the serum was separated & kept at deep freeze until serum analysis. Zinc concentrations in human plasma were determined in North Gas Company by means of atomic-absorption spectrophotometer (Perken Elmer, model 2280) by using air acetylene flame and wave length specific for zinc 213.8 nm, according to standard procedure (14). Results are presented as a mean & standard deviation (SD). Un paired student T test was used to compare between means. P value less than 0.05 was accepted as significant level.

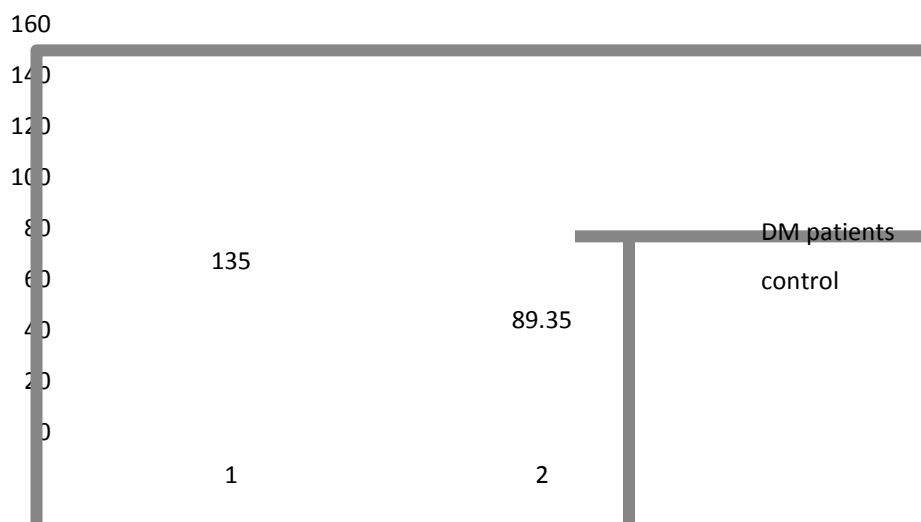
**Results**

Table (1) show the characteristic features of normal control subjects & DM patients, the age, duration of disease, fasting blood glucose, BMI & serum zinc. There is no significant difference regarding age of control subjects & DM patients. However there is significant increase in BMI of diabetic patients as compare with control men. Fasting serum glucose

was significantly higher in DM patients as compare with control subjects. Moreover, there is significant reduction in serum zinc in diabetic patients ( $89.35 \pm 19.23 \mu\text{g/dl}$ ) as compare with normal health subjects ( $135 \pm 35.18 \mu\text{g/dl}$ ), (Figure 1). In diabetic patients, there is significant negative correlation between fasting blood sugar & serum zinc ( $r = - 0.37$ ).

**Table (1):- Show the mean & standard deviation of age, duration, BMI & serum zinc in normal healthy & diabetic patients.**

Parameters	Control	Diabetic patients	P value
Age (years)	$54.6 \pm 2.3$	$56.8 \pm 7.4$	NS
Duration (years)	-----	$3.73 \pm 1.1$	-----
BMI ( $\text{kg/m}^2$ )	$26.38 \pm 2.1$	$29.17 \pm 1.8$	0.05
Fasting serum glucose (mmol/L)	$4.33 \pm 0.16$	$11.31 \pm 2.67$	0.01
Serum zinc ( $\mu\text{g/dl}$ )	$135 \pm 35.18$	$89.35 \pm 19.23$	0.01



**Figure (1):- Show serum zinc concentrations in control healthy (135 ± 35.18) & DM type 2 patients (89.35 ± 19.23 µg/dl).**

### Discussion

Diabetes type II is the most prevalent form & more commonly associated with insulin resistance in the presence of an associated impairment in compensatory insulin secretion & associated with obesity, (15). Previous studies concentrated on the relationship of several minerals & their importance in diabetic patients, (1-12). In the present study, serum zinc was measured in DM patients. There is significant reduction in serum zinc in diabetic patients as compare with normal healthy subjects. Excessive accumulation or depletion of trace elements may have significant implication, including cardiovascular complications, renal function impairment & bone diseases, (16-17). In the present study, there is negative correlation between serum zinc & fasting blood glucose ( $r = -0.37$ ). Zinc is useful in the synthesis, storage & secretion of insulin (13). Zinc may improve serum fasting glucose & may prevent hyperglycemia, (18). Zinc is important in the function of many enzymes, also zinc is important because it plays a role in stabilization of insulin hexamers, and pancreatic storage of

insulin hormone and it is efficient antioxidant, (6-7). In diabetic patients, the oxidation & oxidative stress is regarded as the main component in initiation & progression of insulin resistance, (19). The present study concludes that, there is a significant reduction in serum zinc in diabetic patients. The present study recommends that diabetic patients should be encouraged to eat diet rich in zinc or take zinc supplement.

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