

# **Determination the levels of Zinc and Magnesium in Acne**

## **Determination the levels of Zinc and Magnesium in Acne Patients**

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### **Abstract:**

The aim of this study is to determine the effect of acne disease on zinc and magnesium levels. The design of the project included (18) acne patients (9 males, 9 females) and (12) healthy controls. The results shown significant decrease ( $P \leq 0.01$ ) in zinc and magnesium levels in acne patients compared with healthy controls. Sex difference was obtained as rises for zinc and magnesium concentration in females when compared with male patients, the data stated significantly increase ( $P \leq 0.01, 0.00$ ).

### **الخلاصة**

تضمنت الدراسة قياس مستوى الزنك والمغنيسيوم لدى الأشخاص المصابين بمرض حب الشباب حيث تم أخذ (18) شخص مصاب بهذا المرض و(12) أصحاء أظهرت النتائج انخفاضا معنويا في مستوى الزنك والمغنيسيوم لدى المرضى مقارنة بالأشخاص الأصحاء ( $P \leq 0.01$ ). كما وضحت الدراسة تأثير اختلاف الجنس على مستويات كلا من الزنك والمغنيسيوم وقد أظهرت النتائج ارتفاعا معنويا لدى النساء مقارنة بالرجال وكانت قيم  $p$ -value على التوالي (0.01, 0.00) لكلا العنصرين.

### **Introduction:**

Acne like any other inflammatory disease could be associated with increase in lipid peroxidation, skin damages due to free radical formation <sup>(1)</sup>. Oxidative stress associated with free radicals can cause lipid peroxidation and cell membrane disruption, level of oxidative stress in a cell is measured by its lipid peroxidation and, malondialdehyde(MDA), the end product of this process, in any inflammatory disease lipid peroxidation increase results accumulation of MDA.<sup>(2,3)</sup>. Trace elements used in human body form antioxidant such as zinc and magnesium, all chemical reactions in the body require an enzyme system to help the biochemical reaction take place, an enzyme system generally consists of three parts, they are a specific protein molecule,

another smaller organic compound, which is often a vitamin, such as pyridoxine or vitamin B6, and finally a charged mineral, such as zinc, copper, manganese or magnesium<sup>(4)</sup>.

Zinc can be used by the body to form the antioxidant enzyme superoxide dismutase (SOD), which can protect the body's cells from the damaging effects of free radicals<sup>(5)</sup>. Zinc supplements have been shown to increase the antioxidant activity of SOD, increasing free radical protection, zinc deficiency was associated with increased oxidative damage<sup>(6)</sup>.

zinc functions in more enzymatic reactions than any another mineral and is required for all proper cell division, zinc is important to the proper functioning of the thymic hormones, sex hormones, growth hormone and insulin<sup>(7)</sup>. Magnesium is required for over 300 enzymes in the body and in many instances is a necessary part of the production line of various hormones. eg cholesterol needs magnesium, zinc, Vit C & E to become needed progesterone, cortisone, estrogen and testosterone, it is needed for many of the steps in energy production<sup>(8)</sup>. Magnesium is a critical co-factor in enzymatic reactions in the human body, magnesium is found primarily in the cells<sup>(9)</sup>. Magnesium is involved in the metabolism of proteins, carbohydrates, and fats, it helps genes function properly, some fuels cannot be stored in our muscle cells unless adequate supplies of magnesium are available, the metabolic role of magnesium is so diverse that it is difficult to find a body system that is not affected by magnesium deficiency, our cardiovascular system, digestive system, nervous system, muscles, kidneys, liver, hormone-secreting glands, and brain all rely on magnesium for their metabolic function<sup>(10,11)</sup>.

### **Reagents:**

Determination of zinc by atomic absorption<sup>(12)</sup>. Reaction mixture contained concentrated hydrochloric acid, Glycerol, commercially prepared zinc standard 1000 ppm, stock zinc standard (50µg/dl). In a 100 ml volumetric flask, dilute 500 µg of commercial standard to 100 ml with deionized water, store in plastic container, working standards, serum. Magnesium concentration measured by atomic absorption spectrophotometry<sup>(13)</sup>.

## Determination the levels of Zinc and Magnesium in Acne

The mixture contained lanthanum chloride stock reagent 81.5 g of lanthanum oxide ( $\text{La}_2\text{O}_3$ ), 335 ml of concentrated HCL, use 1L volumetric flask containing approximately 100 ml of concentrated HCL. Transfer 81.5 g of ( $\text{La}_2\text{O}_3$ ) and dilute to a 1L volume with deionized water. Store in a polyethylene container. This reagent is stable for 2 min. at room temperature. Working lanthanum diluents (dilute 20 ml of lanthanum stock solution to a 1L volume with deionized water). Stock magnesium standard (dissolve 100 mg of magnesium in 100 ml of deionized water using a volumetric flask. Working standards for magnesium (three concentrations of working standards are used, add approximately 50 ml of deionized water to each of three 100 ml volumetric flask, pipette the indicated amount of stock standard for each concentration, dilute to volume with deionized water).

### Results:

**Table (1):-Zinc levels ( $\mu\text{g}/\text{dl}$ ) in acne patients and compared with healthy controls.**

Subject	Mean	SD	P-value	Sign.
Control	107.8	10.13	$P \leq 0.01$	Sign.
Patients	67.13	7.18		

**Table (2):- Effect of difference sex on zinc levels ( $\mu\text{g}/\text{dl}$ ) in acne patients.**

Subject	Mean	SD	P-value	Sign.
M	63.3	8.07	$P \leq 0.01$	Sign.
F	70.92	3.47		

**Table (3):- Magnesium levels ( $\text{mEq}/\text{L}$ ) in acne patients and Healthy controls.**

Subject	Mean	SD	P-value	Sign.

Control	1.67	0.25	$P \leq 0.01$	Sign.
Patients	0.93	0.12		

**Table (4):- Effect of difference sex on magnesium levels ( mEq/L) in acne patients.**

Subject	Mean	SD	P-value	Sign.
M	0.84	0.06	$P \leq 0.00$	Sign
F	1.03	0.07		

### **Statistical Analysis:**

The results were expressed as mean  $\pm$  Standard Deviation, comparison between patients and controls were preformed by the student's t-test. Person's correlations were used to determine relationship between parameters studied taken  $P \leq 0.05$  as the level of significant.

### **Discussion:**

Oxidative stress plays role in acne patients that's lead to increase free radicals formation and increase skin disorder <sup>(14)</sup>.

Zinc is beneficial for the immune system for the skin. This study show the high significant levels of zinc in acne patients because it is involved in the maintenance of

# **Determination the levels of Zinc and Magnesium in Acne**

vitamin A levels, vitamin A and zinc act together as skin antioxidants, and may be on assistance in the treatment of acne <sup>(15)</sup> (Table 1).

Zinc is necessary for the functioning of well over 300 different enzymes; it is widely distributed in microorganisms, plants, and animals. In humans, Zinc is highly concentrated in parts of the eye, prostate gland, sperm, skin, hair, and nails <sup>(16)</sup>.

Different sex effect on zinc levels in acne patients. The results show that zinc levels decreased significantly in males compared with female patients, Table (2) due to the most critical trace mineral involved in male sexual function including; male hormone metabolism, sperm formation, and sperm motility<sup>(17)</sup>. Magnesium is necessary for the body to convert short-chain fatty acids into longer chain fatty acids. Essential fatty acids play critical roles in hormonal balance. It's also critical for your body to construct smooth skin<sup>(18)</sup>. Table (3) show significant change in patients compared with the healthy controls, this results may be due to that magnesium is a cofactor for the production and transfer of energy for protein and lipid synthesis. In general, magnesium is required for the metabolism of carbohydrates, proteins and fats, as well as activity related to calcium, phosphorus and vitamin C<sup>(19)</sup>.

Table (4) the effect of sex differences on magnesium concentration, which is obtained significantly decrease in males compared with female patients because changing in hormonal balance, males produce higher levels of both testosterone and dihydrotestosterone than females that's lead to increase acne disorders <sup>(20)</sup>.

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