

## **Evaluation of Manganese (Mn<sup>2+</sup>) in Serum of Acne Patients**

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### **Abstract**

This work aimed to determine the effect of manganese in acne patients. This study showed statistically decreased in manganese levels in acne patients in the range (0.0185-0.0496) mg/dl compared with the normal value (0.05-0.07) mg/dl. The design of the project included twenty acne patient (11males, 9 females) and (15) apparently as controls (8 males, 7 females). Sex difference was obtained as rises for manganese concentration ( $P \leq 0.05$ ) in females when compared with those of the male patients. The influence of treatment was studied, the data stated significant increase ( $P \leq 0.05$ ), in treated acne patients when compared with those of the untreated.

### **الخلاصة**

هدفت هذه الدراسة الى تحديد تاثير المنغنيز لدى الأشخاص المصابين بمرض حب الشباب. بينت النتائج نقصان في مستويات المنغنيز لدى المصابين بهذا المرض حيث بلغ تركيز المنغنيز الثنائي بحدود (0.0185-0.0496) ملغم/100مل مقارنة بالقيمة الطبيعية (0.05-0.07) ملغم/100مل. تمت الدراسة بأخذ (20) شخص مصاب بهذا المرض (11 ذكور، 9 إناث) و 15 شخص ظاهريا أصحاء (8 ذكور، 7 إناث) دلت النتائج على زيادة ملحوظة في تركيز المنغنيز لدى الإناث مقارنة بالذكور حيث بلغت قيمة ( $P \leq 0.05$ ) كما وجد أن هناك تأثير معنوي عند استخدام العلاج عند المصابين مقارنة مع عدم استخدامه حيث كانت قيمة ( $P \leq 0.05$ ).

### **Introduction**

Acne is a disorder that causes outbreaks of skin lesions commonly called pimples. It is caused by the skin's oil glands making too much sebum, an oily substance, which leads to plugged pores<sup>(1)</sup>. Individuals with acne are more likely to have higher values for skin surface total lipid production than do individuals without acne this result caused increase lipid peroxidation levels, because hydrogen peroxide level increase by neutrophils from patients with acne inflammation<sup>(2,3)</sup>.

Drug treatment is aimed at reducing several problems that play a part in causing acne by some elements such as manganese<sup>(4)</sup>.

Manganese (Mn) is a trace element found mainly in nuts, grains and cereals but also found in instant coffee and tea, it is essential for lipid and carbohydrate metabolism, bone and tissue formation and reproductive processes<sup>(5-7)</sup>. Manganese activates several enzyme systems and supports the utilization of vitamin C, E, choline, and other B-vitamins and necessary for the proper digestion and utilization of food; functions in many enzyme systems, including enzymes involved in blood sugar control, energy metabolism, and thyroid hormone function; increases the activity of the anti-oxidant enzyme as superoxide dismutase (SOD), this enzyme is responsible for preventing the superoxid free radical from destroying cellular components<sup>(8-10)</sup>. The 20 milligrams of manganese found in the body mostly resides in the bones, liver, kidneys, and pancreas, manganese is a component of the antioxidant enzyme manganese superoxide dismutase (Mn-SOD)<sup>(11)</sup>.

Mn-SOD can help neutralize free radicals and reduce or even help prevent some of the acne damage<sup>(12)</sup>. Manganese helps the body use several important vitamins, among them vitamin B1, Biotin and Vitamin C<sup>(13)</sup>. The body also utilizes manganese in the production of breast milk, fat and several of the sex hormones<sup>(14)</sup>. This work involved determination of Mn<sup>2+</sup> in acne patients and compared the results with the normal values.

**Experimental**

**Apparatus:**

A UV-Probe model (UV-1650) spectrophotometer (Schimadzu-Japan) and spectronic-21 model U.V-Visible single beam with 1 cm cells Bausch and Lomb (USA) was used for all absorbance measurements, Digital Balance, Sartorius, (BP 3015- Germany) and Water bath, Gesellschaft Fur Labortechnik (Germany).

**Standard Solution**

A solution of  $Mn^{2+}$  (10 mg/100 ml) was prepared by dissolving (0.0022 g) of  $MnCl_2$  in 100 ml distilled water.

Working solution was prepared freshly by appropriate dilution of the stock solution.  $Mn^{2+}$  was determined by using a spectrophotometric method<sup>(15)</sup>.

**Results and Discussion:**

The results of this study shown a decreasing in manganese levels in acne patients compared with normal value, because lipid peroxidation was increased<sup>(16)</sup>. A calibration curve was plotted in the range (0.04-0.4) mg/100 ml of  $Mn^{2+}$ , figure (1) shows the calibration curve.

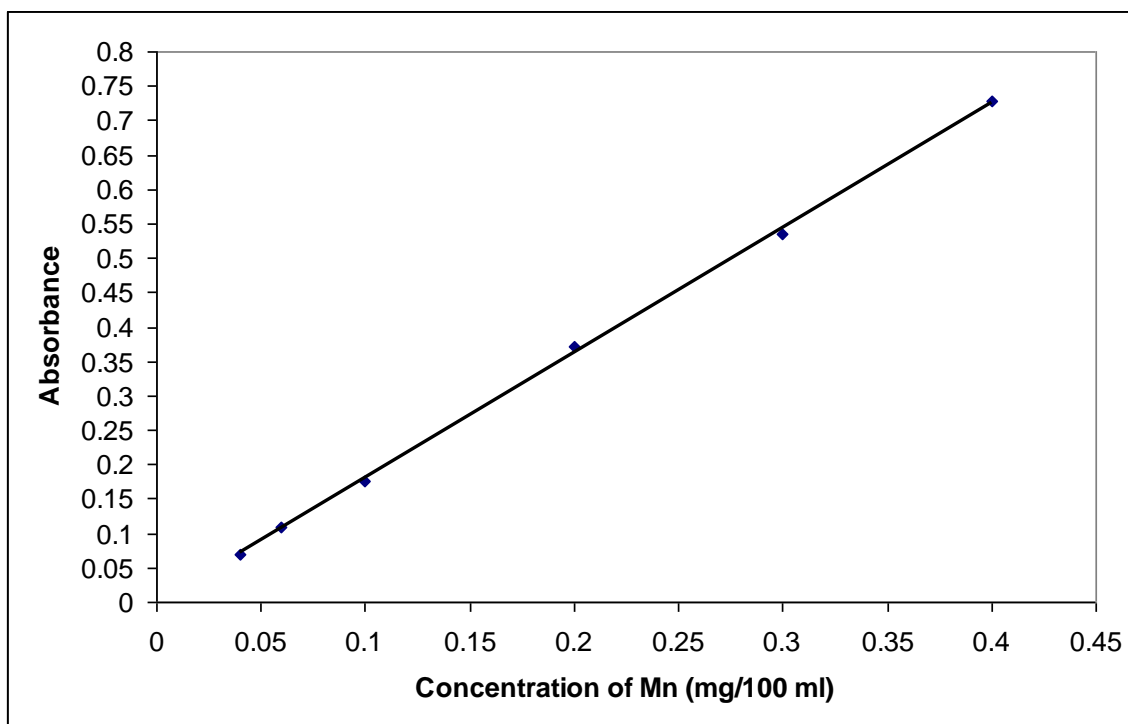


Figure (1) Calibration curve of  $Mn^{2+}$ .

From calibration curve, the linearity ( $R^2$ ) was (0.9995), correlation factor ( $r=0.9997$ ), detection limit was (0.0083) mg/100 ml, RSD% (0.99).  $E_{rel}$  and  $R_e$  were (2.22, 97.88) and ( $\epsilon$ ) was  $18.19 \times 10^4$   $L.mol^{-1}.cm^{-1}$ .

**Effect of sex**

Sex difference on the concentration of  $Mn^{2+}$  in acne patient's show in figure (2)

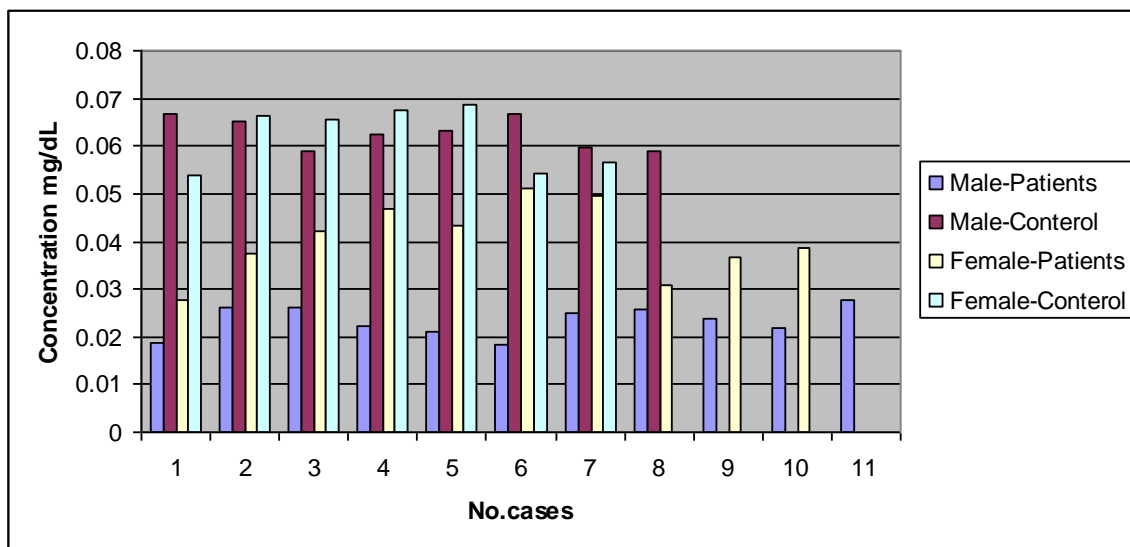


Figure (2) The effect of sex difference

Sex differences in serum lipid peroxidation alteration in acne is involvement of steroid hormones, acne patients were classified into two groups, i.e., 9 females and 11 males. The data were analyzed by using student *t* test. Significant rises were obtained for manganese levels ( $p \leq 0.05$ ) in females when compared with males, because malondialdehyde are involved markedly in the pathogenesis of acne in males so manganese helps to maintain sex hormone production <sup>(17)</sup>.

**Effect of treatment** :

The effect of treatment on the concentration of  $Mn^{2+}$  in acne patient's show in figure (3)

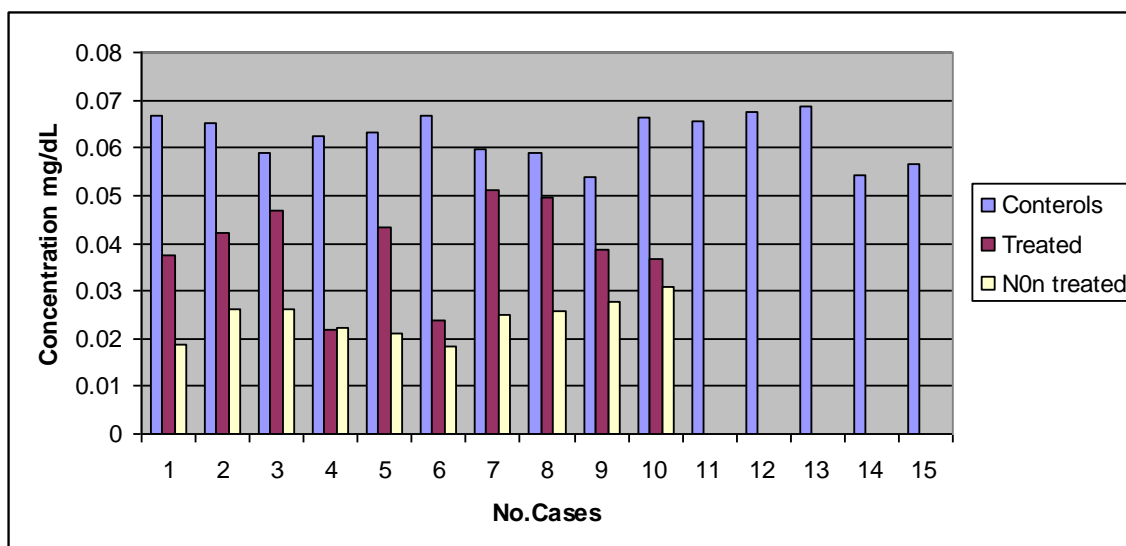


Figure (3) The effect of acne treatment on the concentration of  $Mn^{2+}$  levels

The patients were classified in tow groups treated (10) and untreated (10). The results were analyzed by using student's *t* test. Significant increased elevations were found for  $Mn^{2+}$  levels ( $p \leq 0.05$ ) in treated acne patients when compared with untreated patients, due to manganese is a

catalyst in the breakdown of fats and cholesterol ,it is indicated to lower the risk of hyperlipidaemia in this disease <sup>(18)</sup>.

Finally recommended daily intake of manganese varies from 2 to 5 milligrams daily, depending on age and other factors.

### **Conclusions**

- Manganese levels increased in females more than in males.
- Manganese levels decreased in patients compared with normal value.
- Manganese is one of the reasons to decrease acne disorders.

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