

and Copper Levels in Seropositive Toxoplasmosis Women in Mosul – Iraq

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ABSTRACT

The aim of this Study was to investigate the effects of *Toxoplasma gondii* infection on levels of zinc and copper in seropositive toxoplasmosis women in Mosul city. Serum zinc and copper levels were measured in (77) women whose *-Toxoplasma gondii* antibodies were Positive , in addition to (30) sero – negative healthy women , as control group. The average zinc concentration in serum from sero – positive women was significantly ($P < 0.05$) lower than control group. However compared to the healthy women , the copper concentration in serum of sero-positive women were significantly ($P < 0.05$) higher.

Key word : Zinc , Copper , toxoplasmosis

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(30)

(77)

($P < 0.05$)

($P < 0.05$)

INTRODUCTION

Trace elements are essential for normal growth and development of skeleton and they play important roles in biological systems by participation in structures or as active sites of metalloenzymes. Excess or deficiency causes alterations in respective serum level. Many Phathological conditions such as bronchitis, Pneumonia, Psoriasis , rheumatic heart failure, hemolytic anemia and other infectious diseases result in alteration of the trace elements levels in blood and other tissues (El-Kholy *et al.*, 1990).

Zinc is an element of widespread occurrence within the earth's crust (Thomas , 1998). It is essential for protein synthesis (Standstead *et al.*, 2000), for immune function , that plays a role immune response a gainst parasites (Wellinghausen *et al.*, 1999) and it has many effects on function of same hormones like TSH , GH, LH and FSH (Tudor *et al.*, 2005).

Copper . is a trace element known as a cofactor for many enzymes (Swaminthan , 1999). It is integral part of cytochrome (Griffiths and Wharton , 1961) and it Localized in liver , brain, Kidney and heart and it has role in hemoglobin production (Kazat *et al.*, 2006).

Toxoplasmosis is a disease caused by *Toxoplasma gondii* (Ryan and Ray , 2004) Which is obligate intracellur protozoan Parasite, it is a World – Wide Zoonosis of increasing concerning both human and Veterinary Medicine, it is known to cause transplacental infections that can lead to abortion or sever neonatal malformation (Remington and Desmont , 1983) . The natural host of *Toxoplasma gondii* is the cat , however it also occurs by chance in humans, a large group of domestic mammals (dog , swine , sheep, cattle , goats), certain rodents some birds and a few other animals (Torda, 2001), While this is true , contact with infected raw meat is perhaps a more important cause of human infection in many third world countries. Up to third of the worlds population is estimated to carry a Toxoplasma infection (Montaya and Liesenfeld , 2004). The disease can be transmitted by ingestion of oocyst (in cat feces) or bradyzoites (in raw or under cooked) (Montaya, 2002 , Tenter *et al.*, 2000). However under some conditions, toxoplasmosis can cause serious diseases or infections, including blindness, Pneumonia, hepatitis and sever neurological disorders in patients with human immuno deficiencyVirus (H I V) (Frankel , 1988).

MATERIALS AND METHODS

The Study was carried out on (77) serum – smaples taken from Toxoplasmosis women (acute case) and 30 samples taken from women who showed negative result for serum – Toxoplasmosis (control group). All these women aged (19 – 42) years and attending Central Laboratory in Mosul City. Non of toxoplasmosis women and control group were taken any medication or trace elements supplementation.

Serological test was done Using Latex Agglutination with Toxo-cell-Latex Kit (Bio Kit – Span).

Serum samples were collected in plane tube and frozen at (-20°C) until needed for determination of zinc and copper. Atomic absorption spectrophotometry was used to determine Zinc and copper in seum, the procedure involved a simple sample dilution with deionized water (D'Haese *et al.*, 1992). The analysis was performed a gainst standards prepared in glycerol to match the viscosity of the diluted samples (1:5)

Reagents for zinc determination

Glycerol 5% (V/V)

Zinc metal

Hydrochloric acid , diluted (1+1) with deionized water

Reagents for copper determination

Glycerol 10% (V/V)

Copper metal

Nitric acid , diluted (1+1) with deionized water

RESULTS AND DISCUSSION

The results in table 1 refer to the levels of zinc and copper in seropositive toxoplasmosis women. The mean levels of serum zinc were significantly ($P < 0.05$) lower than in control group, while serum copper concentration were significantly ($P < 0.05$) higher. These results agree with (Ageel, 2003 ; seyerk *et al.*, 2004) they were noted a reduction in serum zinc in human and animals. This mean zinc necessary for immune function and play a role in immune response against parasites (Klassing , 1984). The role of certain inflammatory products in regulation of the zinc balance has been well documented. Thus, leukocyte endogenous mediators (interleukins), released from activated phagocytic cells causing a lowering of zinc levels resulting from increased synthesis of metalothionine in liver and other tissues (Klassing , 1988 ; Svenson *et al.*, 1985). Also zinc deficient animals have suppressed immune responses and are more susceptible to a diverse range of infectious agents including Herpes simplex virus (Feiler *et al.*, 1982). *Listeria monocytogenes* (Coghlan *et al.*, 1988).

Toxoplasma gondii (Tasci *et al.*, 1995) *Trypanosoma musculi* (Lee *et al.*, 1983). In study carried out on rats experimentally infected with toxoplasmosis, showed that, intraperitoneal injections of zinc sulfate at a dose of 3 mg/kg for 3 weeks , stimulating CD4 and CD8 + production and may activate cellular immunity (Avunduk *et al.*, 2007). Zinc status may also affect placental transport of antibodies from the mother to the fetus during the last trimester of pregnancy. Because zinc is important for normal placental development , deficiency may result in impairment in utero aquisition of maternal antibodies by the child as well (Seyoum and Persaud ,1995). Therefore one of the potential beneficial approaches to improve the immune defense against *T. gondii* is zinc supplementation , since due to its catalytic and regulatory functions it can enhance resistance to infections (Mocchegiani *et al.*, 2001).

Table 1 : Comparision between seropositive toxoplasmosis women and control group in serum zinc and copper levels .

Parameter	Control group n=30 mean + SD	Seropositive toxoplasmosis women n=77 mean + SD	P-Value
Zinc $\mu\text{mol/L}$	13.5 \pm 3.0	12.1 \pm 5.6	<0.05
Copper $\mu\text{mol/L}$	19.2 \pm 4.8	20.3 \pm 4.5	<0.05

In contrasts , increase serum copper in toxoplasmosis women may be due to the increased production of the carrying protein ceruplasmine, by zinc – dependent process, copper stores may become depleted (Mclaren – Howard and Grant, 1998). Our study agree with (Seyerk *et al.*,2004) they noted an increase in copper concentration in sheep infected with Toxoplasmosis because the active phase of interleukins that causes increasing in copper concentration . Also our results agree with (Al- Zuhairy , 2008) who pointed to the elevation in serum copper in sheep infected with Toxoplasmosis and attributed this result to

ceruplasmine level that formed in response to inflammation associated with the disease. This study concluded, that zinc should be considered as adjunctive therapy to treatment *Toxoplasma* . In patients with HIV, zinc deficiency is frequently seen by decrease zinc serum concentrations and depressed phytohemagglutinin (PHA) mitogenic responses. These changes are partially reversible by zinc supplementation .

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