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Determination of zinc content in blood serum of malarial patients

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Abstract:

Malaria is a life threatening disease in Pakistan due to unhygienic conditions making the immune system weaker. Metals are present in minute quantities in all parts of the body fluids of organism. Amongst all the trace metals, zinc is very venerable to infectious conditions. The low level of zinc is evaluated in blood serum of patients using the Atomic Absorption Spectroscopy and compared with the healthy controls, which may increase the mortality rate in malarial patients.

Keywords: -Malaria, Infection, Zinc, Trace Metals, Atomic Absorption Spectroscopy.

I. Introduction:

Malaria is a infectious disease caused by p.vivax. It occurs in tropical and subtropical regions, including parts of the Americas, Asia, and Africa.this disease affects nearly 515 million people and makes people to die every year between one and three million people in Sub-Saharan Africa (Snow, *et al.* 2 005). The cost of the disease has made life of the people miserable (Ministry of Health, 2001). The World Health Organization (WHO) and several independent commentators reported that the major problem in the campaign against disease are said to be the insufficiem resources (WHO, 2002-2003).

Malaria can be transmitted to people of all ages by Plasmodium that becomes carrier from individual to individual through infected bites, the major symptom of disease is cyclic followed by chilliness fever and sweating for four to six hours and occurring every two days in P. vivax (Malaria life cycle & pathogenesis, 2006). Zinc is found throughout the all-physiological systems and has got different function in the systems, this characteristic owes to its different physicochemical properties For example; zinc assumes a number of coordination and geometries making it steriochemically adaptable to the physiological needs of various ligands (Vallee, *et al*, 1993).

Under physiological conditions, zinc is not meant to oxido-reductive reactions, so it is comparatively non-toxic. These properties made the zinc an ideal element in catalytic, structural, and cellular functions (Cousins, *et al.* 1996).

Shankar, *et al.* (1998) reported that Zinc deficiency affects humans growth thymic atrophy, lymphopenia, impaired T and B lymphocyte function, impaired chemotactic activity of neutrophils, and a reduction in thymulin activity, interferon-concentrations, and the number of CD4 (helper) lymphocytes .

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In our study Atomic Absorption Spectroscopy (Varian Model, A-20) is utilized to quantities Zinc in the blood serum of malarial patients compared with healthy controls. The results of this study will contribute to open up a new way to therapeutic approach in treating malarial patients.

2. Material and Method:

Venous blood samples were collected into tubes without any addition of anticoagulants in 12 healthy controls in fasting condition and similar condition was maintained while taking the blood samples of patients with Malaria (**Table no: 1**). 10 ml of blood are collected and made to clot before serum was separated by centrifuged. This test tube were collected and stored at -40° C prior to analysis of Zinc (Zn) metal.

Table 1; Clinical data of Controls and Malarial patients.

Patients	Number of Patients	Female Patients	Age (Mean)
Control	12	3	45.92
Malarial	12	4	34.67

All standards used were of analytical grade. Serum samples were treated with 1M sulphosylicylic acid (SSA) and centrifuged at 5000 r.p.m for 10 min. and the clear supernant solution was subjected for the estimation of Zinc metal by using atomic absorption spectrophotometer (Model, A-20 Varian).

3. Results and Discussion:

After brought over all blood serum samples into analytical grade, samples were analyzed using Atomic Absorption Spectroscopy by inserting hollow cathode lamp of wavelength 213nm for Zinc determination. **Table 2** shows that serum zinc concentrations amongst all analyzed samples are significantly reduced in malarial patients with comparison to control subjects. ***Figure 1*** shows decreased serum mean values of zinc in infected persons compared with control subjects

When body zinc content is reduced the loss of zinc is not uniform across all tissues (Jackson, *et al*, 1982).

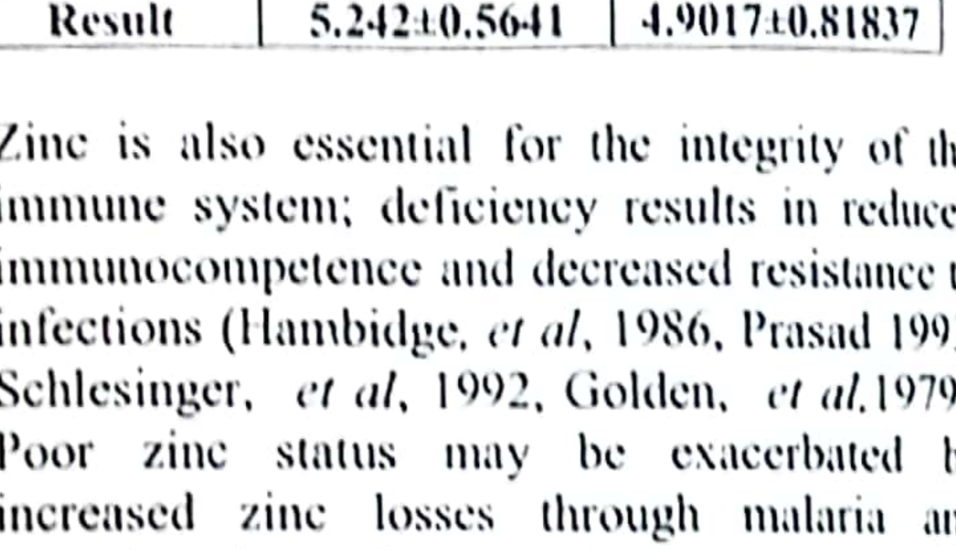
Zinc deficiency also has direct effects on the gastrointestinal tract that lead to an increased clinical severity of acute enteric infections (Roy, *et al*, 1989,1992).

Table : 2. Levels of serum Zinc in healthy controls and malarial patients. All values are expressed as mean± SEM

Zinc	Normal persons (Mean± SEM)	Malarial patients (Mean± SEM)
Number of Persons	12	12
Result	5.242±0.5641	4.9017±0.81837

Zinc is also essential for the integrity of the immune system; deficiency results in reduced immunocompetence and decreased resistance to infections (Hambidge, *et al*, 1986, Prasad 1993, Schlesinger, *et al*, 1992, Golden, *et al*,1979). Poor zinc status may be exacerbated by increased zinc losses through malaria and gastrointestinal diseases, both of which are endemic in Uganda (Kakuramatsi, *et al*, 1996).

Fig. 1. Shows serum Zinc mean level of healthy control and malarial patients.



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