

## Determination of Trace Elements in Patients with Chronic Hepatitis B

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**Abstract-** Chronic Hepatitis B virus (HBV) infection is a major liver disease worldwide and its clinical manifestations are linked to immune response. The purpose of this study was to evaluate the relationship between selenium, copper, and zinc in comparison with transaminase level in chronic HBV patients. Serum samples of the HBV infected patients were obtained from Tooba medical center, Sari, Iran. Sixty patients were enrolled in this study (36 men and 24 women), mean age:  $39.6 \pm 12.2$  years. The concentration of zinc, selenium, copper and transaminases were determined using an autoanalyzer system. Concentrations of selenium ( $0.273 \pm 0.056$   $\mu\text{g/dl}$ ) and zinc ( $2.1 \pm 0.037$ ) was elevated in patients with low transaminase levels as were significantly different in comparison with patients with high transaminase level ( $P < 0.05$ ). Serum copper concentration was similar in two groups of patients. Elevated levels of transaminase concentrations were independently associated with low zinc and selenium concentrations in chronic HBV patients. It is concluded that serum zinc and selenium levels are associated with less hepatic damage in chronic HBV patients and might have a protective role during liver injury.

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**Keywords:** Zinc; Selenium; Hepatitis B; Copper

### Introduction

Chronic Hepatitis B virus (HBV) infection is a major liver disease that clinical outcome of infection is linked to immune response (1,2).

The disease may develop to liver carcinoma in during infection. Up to now, many studies have shown that trace elements have an important role in metabolic activity and health condition (3). It is demonstrated that trace elements have a major role in protein synthesise, pregnancy abnormalities and immune function (4,5). Selenium is an antioxidant trace element that has a key role in immune defense. It is recognized that selenium deficiency might be associated with diabetes and cardiovascular diseases (5). Furthermore, Zinc deficiency has an undesirable role in growth development, gonads maturation and ulcer repair (4,6). Copper is another trace element that has an effective role in hemoglobin synthesise, increased iron absorption and phospholipids synthesise (6,7). In addition, the levels of selenium, zinc and copper are altered in a variety of

malignancies (7). Liver damage is associated with elevated transaminases levels in chronic HBV patients (8). AST and ALT levels are routinely determined in patients with hepatitis (9). The role of trace elements and their association with degree of liver damage is not completely understood in patients with chronic hepatitis B. Thus, the purpose of this study was to evaluate serum selenium, zinc and copper concentrations in chronic HBV infected patients in regards to their serum transaminase levels.

### Material and Methods

The study group included 60 patients with chronic HBV who were referred to Tooba medical center (Mazandaran province, Iran) for diagnosis and treatment. Patients were enrolled in the study after obtaining written consent. Patients with positive HBSAg for more than six months were considered for the study.

Whole peripheral blood was obtained from chronic HBV patients.

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## Trace elements in the chronic hepatitis B patients

**Table 1.** The concentrations of AST and ALT in the two groups of patients infected with HBV. Data are expressed as mean  $\pm$  SD.

Transaminase	Group 1	Group 2	P value
AST (IU/L)	29.6 $\pm$ 7.5	103 $\pm$ 11.56	<0.05
ALT (IU/L)	33 $\pm$ 17.2	195 $\pm$ 11.40	<0.05

After serum separation, the concentration of selenium, zinc and copper was determined using standard kit-based assays. The assays were performed in duplicate and the concentrations were calculated from a standard curve according to the manufacturers protocol (Greiner, Germany). AST and ALT were measured using an autoanalyzer system (Prestige 24i Instrument, Kobe, Japan).

We categorized the patients in two groups based on their AST and ALT levels in comparison with trace elements levels as shown in table 1.

### Statistical analysis

Student's *t*-test was used for statistical analysis. The  $P < 0.05$  was considered statistically significant. Data are presented as mean  $\pm$  SD.

### Results

The patients groups were 60 patients with HBV (36 men and 24 women), mean age 39.6 $\pm$ 12.2 years. All patients were HBSAg positive, HBeAg negative and HBeAb positive. Low levels of AST and ALT were observed in patients with elevated selenium and zinc levels (Table 2). Increased levels of AST and ALT concentrations were correlated with low concentrations of zinc and selenium. The mean values of zinc and selenium was significantly different in patients with high transaminase levels in comparison with low AST and ALT levels (Table 1, 2). No significant difference was found in mean copper values between the two groups.

**Table 2.** Trace elements concentration in the chronic HBV patients with normal and abnormal AST and ALT. Data are expressed as mean  $\pm$  SD.

Trace elements	Patients with normal ALT and AST(group1)	Patients with elevated ALT and AST(group2)	P value
Zn(mg/L)	2.1 $\pm$ 0.37	0.87 $\pm$ 0.2	<0.05
Copper( $\mu$ g/dl)	169.5 $\pm$ 64	115 $\pm$ 40	>0.05
Se( $\mu$ g/dl)	0.273 $\pm$ 0.056	0.002 $\pm$ 0.0006	<0.05

## Discussion

In this study, the concentration of zinc, copper, and selenium were determined in hepatitis patients in regards to their transaminase levels. It is known that immunomodulatory agents such as zinc and copper play an important role in cancer and pregnancy (10). Zinc influences host immune defense via innate and acquired immunity (10). We showed that higher zinc concentration in chronic HBV patients' correlated with low levels of AST and ALT. Initial studies showed that zinc has an important role in tissue repair (11). In addition, trace elements can modify some enzymes activity (12,13). Gomes *et al.*, showed that trace elements are involved in pathogenesis of hepatitis C infection (14,15).

Our study showed that zinc and selenium levels were decreased in HBV patients with higher degree of hepatic damage. Increased AST and ALT concentrations in HBV patients was consistent with low concentrations of zinc and selenium.

These finding can suggest that zinc and selenium level in serum could be related with structural condition of the liver. Although, the effects of zinc and selenium deficiency on the liver damage is not clear but the effect of zinc and selenium deficiency on liver repair mechanism might be modified by dietary zinc and selenium consumption. This study showed that zinc and selenium might be considered as a marker of healthier liver. It is also concluded that suitable concentration of zinc and selenium are necessary for preventing the liver damage in chronic HBV patients.

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