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SERUM COPPER AND ZINC CONCENTRATION IN PATIENTS WITH CHRONIC HEPATITIS C

1. **QASIM RAHOPOTO**
M.B.B.S., M.D. (Medicine)
2. **SAMIULLAH SHAIKH**
M.B.B.S., FCPS (Medicine)
3. **MUZAFFAR A. SHAIKH**
M.B.B.S. M.D(Medicine), D.T. C.T
4. **ABDUL AZIZ MASTOI**
PG Student Phd.
5. **SOHAIL AALMANI**
M D

1. ***Assistant Professor***
Department of Medicine
LIAQUAT UNIVERSITY OF MEDICAL AND HEALTH SCIENCES (LUMHS)
JAMSHORO, SINDH.
4. ***Assistant Professor***
Department of Medicine
LIAQUAT UNIVERSITY OF MEDICAL AND HEALTH SCIENCES (LUMHS)
JAMSHORO, SINDH.
3. ***Associate Professor***
Department of Medicine
LIAQUAT UNIVERSITY OF MEDICAL AND HEALTH SCIENCES (LUMHS)
JAMSHORO, SINDH.
4. **Department of Chemistry**
UNIVERSITY OF SINDH
JAMSHORO, SINDH PAKISTAN
5. ***Professor***
Department of Medicine
LIAQUAT UNIVERSITY OF MEDICAL AND HEALTH SCIENCES (LUMHS)
JAMSHORO, SINDH.

Correspondence:
DR. QASIM RAHOPOTO
Assistant Professor
Department of Medicine
LIAQUAT UNIVERSITY OF MEDICAL AND HEALTH SCIENCES (LUMHS)
JAMSHORO, SINDH, PAKISTAN
Email: Rahopoto_qasim@yahoo.com,
Cell: 0333-2600836

ABSTRACT

AIMS/OBJECTIVE: *The aim of this study was to compare the alterations in serum trace elements, including zinc and copper in patients with chronic hepatitis C and to compare them with the results of healthy individuals.*
STUDY DESIGN: *Case control comparative*
PLACE AND DURATION: *Medical Unit III Liaquat University of Medical and Health Sciences, Jamshoror / Hyderabad from July 2008 to June 2009.*
MATERIALS AND METHODS: *One hundred patients with chronic hepatitis C and fifty healthy individuals. Serum zinc and copper concentration measured by using atomic absorption spectrophotometer of patients with chronic hepatitis C and the results were statistically compared with those of healthy individuals.*
RESULTS: *Serum zinc concentrations were (n = 100) 3.2357 + 1.2096 in patients with chronic hepatitis C and (n = 50) 4.246 + 1.15 in healthy controls respectively. Serum zinc were found statistically highly significant in patients with chronic hepatitis C compared with those of healthy individuals P < 0.001.*
Serum copper concentration were (n = 100) 2.210 + 0.1967 in patients with chronic hepatitis C and serum copper concentration 2.073 + 0.5306 in healthy subjects, respectively. Serum copper were found statistically highly significant in patients with chronic hepatitis C compared with those of healthy individuals.
CONCLUSION: *Serum copper concentration is higher in chronic hepatitis C patients as compared to healthy control. This increase copper may contribute to hepatic injury. The serum zinc levels were significantly lower in chronic hepatitis C patients than healthy control group.*

KEYWORDS: Zinc, Copper, Hepatitis C virus.

INTRODUCTION:

There has been great debate in the scientific field about this relationship between trace element and human health. More achievements have been made in the determination of the distribution of trace elements in the human body research on the value of the trace elements to disease diagnosis and treatment and prevention of disease. Since the metabolism of the trace elements takes place in the liver, the concentration of each trace elements may be varied with different types of liver disease. The present study was under taken to determine copper and zinc in chronic hepatitis C patients and healthy control group. In recent years several authors have studied trace metals in patients with chronic hepatitis to evaluate the relationship between metals loads and liver damage.[1] The significance of the biochemical and nutritional roles of trace elements (i.e. zinc, copper) is widely recognized, since these elements are constituent components of many metalo protein and metalo enzymes [2] serum trace elements levels and their ratios are frequently reported to be a good marker for diagnosing various diseases. These parameters are not always specific to the diseases, however, it is necessary to use other serum parameters for an exact diagnosis.[3] Copper accumulates in fibrotic liver caused by HCV infection may contribute to hepatic injury.[4] The hepatic copper contents increased with the progression of hepatic fibrosis and concluded that the presence of copper may enhance HCV infection.[5] The reduction in the intra cellular. Zinc and increase in the copper have been reported in association with chronic liver disease.[6] Zinc mostly remains intra cellular and participates in many physiological mechanisms. Liver function like urea formation require the presence of zinc.[7] Adequate zinc status is essential for T cell division, maturation and differentiation, lymphocyte response to mitogens, programmed

cell death of lymphoid and myeloid origins, gene transcription and bio membrane functions.[8]

MATERIALS AND METHODS:

This case control comparative study was conducted at Medical Unit III, Tertiary Care Teaching Hospital Liaquat University of Medical and Health Sciences Hyderabad / Jamshoro. One hundred patients with chronic hepatitis C (65 males, 35 females, mean age of patients 31.5 + 8 years). Healthy fifty individuals (35 males, 15 females mean age 40.0 + 5.0) were included in the study. (Table 1) Patients were not administered anti viral treatment before this study. Chronic hepatitis C was diagnosed by biochemical and viral investigations. Serum transaminase was measured by spectrophoto metric method. Normal range of serum transaminase accepted as 49 IU/L. All patients has Alanine aminotransferase (ALT) abnormally high for longer than 6 months. Anti HCV were determined by third generation ELISA. HCV RNA was determined by polymerase chain reaction (Amplicor Roche diagnostic, USA). Serum zinc and copper concentrations were measured by using atomic absorption spectrophotometer in sera of patients with chronic hepatitis C and statistically compared with those of healthy individuals.

Statistical analysis:

The descriptive analysis of continuous variables were expressed as mean + SD and student t test (2 tailed) was applied to compare the means among the patients and control groups. Categorical variable were expressed as n(%) and Fisher's exact test of chi square was applied to compare the proportions. The statistical analysis was performed using SPSS version 16.0 on 95% confidence interval. A p value < 0.05 was considered as statistically significant level.

RESULTS:

Serum zinc concentrations were (n = 100) 3.2357 + 1.20 in patients with chronic hepatitis C and (n = 50) 4.246 + 1.152 in healthy control respectively. Serum zinc were found statistically highly significant in patient with chronic hepatitis C compared with those of healthy individuals $P < 0.001$. Serum copper concentrations were (n = 100) 2.210 + 0.1967 in patients with chronic hepatitis C and 2.073 + 0.53 in healthy subjects respectively. Serum copper were found statistically highly significant in patients with chronic hepatitis C compared with those of healthy individuals $P < 0.02$.

Table No.1 :

Characteristics	Patients n=100(%)	Control n=50(%)	*P* Value
Age (in years)	31.5 + 8.27	40.0 + 5.93	<0.001†
Sex:			
Male	65(65.0%)	35(35.0%)	0.58
Female	35(70.0%)	15(30.0%)	

Results are presented as Mean + Standard Deviation

†*P* value is highly significant calculated by Student *t* test

Table No .2

Variable	Patient (n=100)	Control (n=50)	*P* Value
Zinc	3.2357 + 1.2096	4.246 + 1.1521	<0.001†
Copper	2.210 + 0.1967	2.073 + 0.5306	0.02†

Results are presented as Mean + Standard deviation

†*P* value is statistically significant calculated by Student *t* test

(Table No. 2)

DISCUSSION:

Reduction in the intra cellular zinc and increase in copper have been reported in association with chronic liver disease and an increase in the copper content in a small HCC.[9] Clinical studies reported that hepatitis C virus (HCV) related chronic liver disease patients at different stages of liver damage have impaired metabolism of trace elements.[10] Of these trace elements serum copper and zinc levels have been reported to be highly sensitive in the diagnosis of some cancers and hepatic disorders (viral hepatitis and cirrhosis)[11] Kalkan et al. determined serum trace elements concentrations including selenium, zinc, and copper in sera of patients with viral hepatitis A, B, C, D, E (n = 102) and compared the results with the controls (n = 52) serum Cu levels were found to be significantly higher in patients with viral hepatitis than control groups. Both, serum and zinc concentrations were found to be significantly lower in viral hepatitis. They concluded that the decrease in Zn and selenium concentrations and the increase in Cu concentrations probably resulted from defence strategies of the organism and these were induced by the hormone like substance[12]: The trace elements play important role in liver disease particularly with parenchymal liver degeneration. The most important trace elements in this concept are zinc and copper.[13] Zinc regulates the cellular and immunological function and it is found as cofactor in several enzymes. It is reported that hypozyncemia develops in cases of advanced liver damage and acute hepatitis.[14]

Salih Cesur et al. compared serum zinc and copper concentrations in patient chronic hepatitis C (n = 17) and control healthy (n = 17), they did not find any statistically significant difference between healthy individual and patient with chronic hepatitis C.[15].

In contrast, in our study serum copper zinc concentration in patients with chronic hepatitis C (n = 100) with healthy control (n = 50) we found statistically highly significant patients with chronic hepatitis C compared with those of healthy individuals $P < 0.001$. We found serum copper concentration is higher in chronic hepatitis C patients as compared to healthy control groups. The serum zinc concentrations were significantly lower in chronic hepatitis C patients than healthy control groups. Pramoolsinsap C et al. compared serum zinc and copper concentrations in patients

with acute hepatitis B and healthy groups. Compared to healthy controls, the patients had significantly decreased serum zinc but elevated copper concentrations.[16]

CONCLUSION:

The serum copper concentration is higher in chronic hepatitis C patients as compared to healthy control. This increased copper concentration in chronic hepatitis C patients may contribute to hepatic injury. The real mechanism is not known at present but excess copper may damage the liver by oxidative stress.

The serum zinc levels were significantly lower in chronic hepatitis C patients than healthy control group. The zinc supplementation may be complementary therapy to chronic hepatitis C patients. Further large scale studies are required to clarify the effect of Zinc supplement on chronic hepatitis C patients.

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