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Research Article

**INCIDENCE OF LOW ZINC LEVELS IN PATIENTS WITH
LIVER CIRRHOSIS AND HEPATIC ENCEPHALOPATHY****Dr Daud Ahmad khan¹, Dr. Muhammad Hamad², Dr Muhammad Awais¹**¹ Services Hospital Lahore² Jiangxi University of Traditional Chinese Medicine**Article Received:** December 2019 **Accepted:** January 2020 **Published:** February 2020**Abstract:*****Aim:** To determine the frequency of low serum zinc in cirrhotic patients with liver encephalopathy.****Study design:** A cross-sectional study****Place and duration:** In the Department of Gastroenterology, Services Hospital Lahore for one year duration from March 2018 to March 2019.****Method:** 114 cases were included in the study. Serum zinc was analyzed for all patients. The result variable of this study is low serum zinc.****Results:** The average age of patients was 47.8 ± 7.5 years. In terms of gender distribution, 79 patients (69.3%) are men and 35 patients (30.7%) are women. Distribution of grades of hepatic encephalopathy was as follows: 18 patients (15.8%) of grade-I, 32 patients (28.1%) of grade-II, 47 patients (41.2%) of grade-III and 17 patients (14.9%) of grade-IV. In 82 patients (71.9%); low serum zinc levels was noted in cirrhotic patients with hepatic encephalopathy.****Conclusion:** The lowest serum zinc levels were found in patients with cirrhosis and hepatic encephalopathy. Therefore, routine biochemical assessment of zinc in patients with cirrhosis is an important step in the treatment protocol and reduces disease progression.****Key words:** serum zinc levels, liver cirrhosis, hepatic encephalopathy***Corresponding author:****Dr Daud Ahmad khan,**
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INTRODUCTION:

Cirrhosis is a consequence of chronic liver disease, which is characterized by replacing liver tissue with a fibrous wound that leads to progressive loss of liver function. Most patients remain asymptomatic up to an advanced stage called decompensated liver cirrhosis, characterized by ascites bleeding due to ascites, spontaneous bacterial peritonitis, hepatic coma or portal hypertension¹.

Every day, millions of people around the world are affected by liver disease. However, in developing countries where health care costs are always a problem, long-term illnesses such as cirrhosis and complications are an important health problem and pose a serious challenge to the health economy².

About 30% of patients with cirrhosis die of hepatic coma (hepatic encephalopathy). Cirrhosis is a common cause of mortality among the Pakistani population and is a common reason to apply in our hospitals.

Hepatic encephalopathy is characterized by personality changes, mental disorders and a depressed level of consciousness³. An important condition of this syndrome is that the portal blood is directed to the systemic circulation through port-o-systemic collateral vessels. The development of hepatic encephalopathy is to some extent explained by the action of neurotoxic substances that occur in patients with cirrhosis and portal hypertension⁴.

Hepatic encephalopathy is associated with poor prognosis. Stamoulis et al. In a study published by Digestive Diseases and Science in 2015, the low incidence of serum zinc in patients with cirrhosis was 65.3%. Zinc is necessary for the synthesis of coenzymes that mediate the synthesis and metabolism of biogenic amines⁵.

Zinc serum was low in 69% of patients. According to the Child-Pugh classification, 72% of patients with cirrhosis with zinc deficiency are class C, 16% for class B and 12% for class A. The recommended

daily allowance (RDA) is 8 mg / day for women and 11 mg / day for men. Red meat, especially lamb and liver, has one of the highest concentrations of zinc in food.

Protein metabolism disorders in liver cirrhosis may affect prognosis or cause complications, so there was an improvement in nitrogen metabolism disorders in liver cirrhosis following the administration of zinc branched chain amino acids⁶. There is no local data regarding the frequency of low serum zinc in patients with cirrhosis and hepatic encephalopathy. Therefore, this study aimed to determine the frequency of low serum zinc in patients with cirrhosis who will have hepatic encephalopathy in our population⁷. This study will indicate the low size of zinc in hepatic encephalopathy in our patients. If the results of this study are unforgettable, it is suggested to add them to the future protocol of local treatment of hepatic encephalopathy.

MATERIAL AND METHODS:

The study was conducted in the Department of Gastroenterology, Services Hospital Lahore for one year duration from March 2018 to March 2019. One hundred and fourteen patients were included in the study. Inclusion criteria included both the sex of patients aged 18-60 with severe hepatic encephalopathy in abdominal ultrasound, as well as any degree of encephalopathy in the presence of thick liver ultrasound and high levels of ammonia. Patients with stroke, hypoglycemia or refusing to register were excluded from the study.

A total of 114 patients were selected with abdominal ultrasound and serum ammonia above normal and of any grade of encephalopathy were selected. The patient's biological data was recorded and written consent was obtained. Serum zinc was used for all selected patients.

RESULTS:

114 patients participated in the study. Most patients were 41-50 years old and the minimum number of patients was 20-30 years. The mean age of the patients was 47.8 ± 7.5 years (Table 1).

Table-1: Distribution of patients by age

Age (Year)	n	%age
20-30	12	10.5
31-40	37	32.5
41-50	40	35
51-60	25	22
Total	114	100
Mean±SD	47.8±7.5	

In terms of gender distribution, 79 patients (69.3%) were male and 35 patients (30.7%) were female (Table 2).

Table-2: Distribution of patients by sex

Sex	n	%age
Male	79	69.3
Female	35	30.7
Total	114	100

The distribution of degrees of hepatic encephalopathy is as follows: grade I 18 patients (15.8%), grade II 32 patients (28.1%), III. Class 47 patients (41.2%) and grade 17 patients (14.9%) IV (Table 3).

Table-3: Distribution of cases by grades of hepatic encephalopathy

Grade	n	%age
I	18	15.8
II	32	28.1
III	47	41.2
IV	17	14.9
Total	114	100

Low serum zinc was detected in 82 patients (71.9%) in patients with cirrhosis with hepatic encephalopathy (Table 4).

Table-4: Low serum zinc levels in cirrhotic patients with hepatic encephalopathy

Low Zinc Level	n	%age
Yes	82	71.9
No	32	28.1
Total	114	100

The dissection for different degrees of hepatic encephalopathy is shown in Table 5.

Table 5: Stratification for different grades of hepatic encephalopathy

Low serum zinc level	Grades of hepatic encephalopathy			
	I	II	III	IV
Yes	11	23	35	13
No	7	9	12	4
Total	18	32	47	17

DISCUSSION:

Hepatic encephalopathy is characterized at the neurophysiological level by disturbed corticocortical and corticomuscular coupling, and at the cellular level by primary gliopathy. Ammonia is an important pathophysiological factor in hepatic encephalopathy. Astrocytes in the brain detoxify ammonia by a reaction catalyzed by glutamine synthetase; an increase in the glutamine / glutamate ratio in the brain is associated with a decrease in myo-inositol, which reflects the correction of glial edema. Inflammatory astrocytes are prone to neuronal dysfunction, affecting their regulatory actions against increased nitration of tyrosine protein and the formation of reactive types of oxygen and nitrogen oxides, including nitric oxide. If they do not react, these reactions promote RNA oxidation, which results in gene expression and transcription of modified proteins⁸.

Zinc, copper, manganese and magnesium are the main trace elements that are still being studied, their

role in liver cirrhosis and its complications. There have been negative reports of serum concentrations in patients with liver cirrhosis. Zinc is associated with over 300 enzyme systems. Zinc strengthens the natural defense of reactive oxygen radicals by superoxide dismutase⁹.

In this study, serum zinc levels were significantly low in most (71.9%) patients with cirrhosis with encephalopathy. The results confirm the Kugelmans study, which explains the low level of zinc at low intake due to protein retention, greater loss in the gastroenterological system and increased urine loss due to diarrhea or poor intestinal absorption.

McClain and Gill-Extremera et al¹⁰. Are also assumed protein deficiency is often observed due to poor dietary intake. Our results confirm the findings regarding the reduction of serum zinc in patients with cirrhosis¹⁵.

The study "Elik" found a reduction in serum zinc and acid in patients with cirrhosis¹⁴. The interaction between zinc and copper in intestinal absorption and their competition for carrier proteins and binding sites in cell absorption can be homeostasis regulators¹³. Perhaps this can explain the inverse concentrations of zinc and copper. Zinc binds to albumin, transferrin and metallo-proteins in the cell, so that the relative concentrations of these proteins can regulate serum zinc¹¹.

Because zinc binds to serum albumin, it is believed that serum zinc concentration decreases with advanced liver fibrosis. Yoshida et al. Patients with uncompensated cirrhosis were found to have lower zinc levels than patients with compensated cirrhosis. Hatano et al¹². In a study performed by serum zinc levels, they did not differ significantly between liver fibrosis levels.

CONCLUSION:

As a result, the lowest serum zinc levels were found in patients with cirrhosis and hepatic encephalopathy. Therefore, routine biochemical assessment of zinc in patients with cirrhosis is an important step in the treatment protocol and reduces disease progression.

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