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AN ASSESSMENT OF LIVER CIRRHOSIS PATIENTS WITH A DEFICIENCY IN THE LEVEL OF SERUM ZINC (Zn)

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Abstract:

Objective: *Determining the level of serum zinc in liver cirrhosis patients.*

Material and Methods: *This research study was carried out at Sharif Medical Hospital Lahore. Male and female participants with diagnosed cases of liver cirrhosis and having age 12 years and above were additionally assessed for their serum Zinc level. Software SPSS was used for statistical data analyses and statistically, the important p-value was considered as <0.05.*

Result: *The assessments and evaluations were made for 130 cirrhotic patients with the means age 40.7560±158890. In 71% patient serum zinc was deficient. As per the Child-Pugh Classification, in class A, B & C there were respectively 12%, 16% and 73% zinc lacking cirrhotic participant subjects. The Participants diagnosed with the Hepatitis C virus were 94%, infected with Hepatitis B virus were 4% and having the history of using alcohol were 2%.*

Conclusion: *Cirrhosis patients were having the deficiency of serum zinc level.*

Keywords: *Epidemiology, Gender Factor, Aetiology, Chronic Liver, Gastrointestinal, Liver Cirrhosis.*

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INTRODUCTION:

There are many possible causes behind Cirrhosis but most Common are alcoholism, Hepatitis B or C [1]. Cirrhosis is resultant from chronic liver illness characterized by liver tissue replacement with the fibrous scar, bringing liver malfunctions. Liver cirrhosis Epidemiology differs with respect to Gender factor, ethnic societies, and geographical dispersal. In the year 2000, Mexico had the fifth leading cause of death due to liver cirrhosis. Moreover, the 12th usual reason causing death in the United States [3]. There were no symptoms in many patients until decompensated cirrhosis which is advances stage, characterized by spontaneous peritonitis of bacteria, ascites, variceal bleeding or hepatic coma from portal hypertension. Cirrhosis patient medical inspection may disclose many findings necessitating a gastrointestinal or hepatic based work-up for determining the aetiology. A correlation is detected among biopsy-proven basic hepatic illness and obstinately disturbed liver function examination for diagnosing liver cirrhosis biopsy ought to be noticed when the entire primary and definite measuring actions were unsuccessful to confirm [4]. The method for the treatment is commonly against the fundamental difficulties such as bleeding oesophagal varices prepared by rubber band ligation or endoscopic sclerotherapy. Often, oedema and ascites are reactive to peritoneal paracentesis, low sodium and diuretic therapy [5]. For managing the hepatic encephalopathy agents like lactulose and low protein foods are used. Usage of a strong antibiotic is recommended against the infections like as spontaneous peritonitis of bacteria. Coagulation disorders many times respond to fresh frozen and vitamin K plasma. But transplantation of the liver is very effective for the remedy of cirrhosis at the end-stage [6]. The zinc as a metallic element is also called spelter it is symbolized as Zn, atomic no is 30 and in periodic table's group 12, as a transition metal [7]. RDA for the men and the women is 8mg/day and 11 mg/day respectively. The meat of lamb, liver, beef or any other type of red meat is in possession of extreme concentrations of zinc in diet [8]. A large number of populations approximately two billion, within developing countries are having a deficiency in zinc level [9]. Deficiency of serum zinc level is commonly found in liver cirrhosis patients because of less consumption, reduced absorption, reduced bioavailability and because of malabsorption increased losses. The reduced liver protein synthesis is also found in liver cirrhosis patients. An important protein for zinc binding is MT (Metallothionein) which is formed by the liver and it has participation in homeostasis, metabolism of zinc and its releases in quantity of oxidants, the free unconfined zinc will constrain enzymes actions included within fibrogenesis within the liver. These are named as pathophysiological methods [10, 11]. Neutrophil characteristics require zinc as a very important element and zinc is very important for the maintenance of immunity in the human. Current evidence highlights that T cells (Thymic-dependent lymphocytes) T-helper cells, T effector cells, T-natural killer cells, and T Suppressor cells, depend upon zinc [12]. In the year 2007, a study presented by Stamoulis et al stated that in cirrhotic patients, the occurrence of the lower level of serum zinc was 65.3% [13]. Our study carried out at Medical Department of Sharif Medical Hospital Lahore. The objective and concentration of our research study comprise over evaluation and assessment of the level of serum zinc in liver cirrhosis patients. It is believed that our study will open new gateways for the provision of knowledge through discussion and information with respect to the physical diagnosis of the liver cirrhosis patients for the betterment of management for liver cirrhotic patients.

MATERIAL AND METHODS:

This research study held at Medical Department of Sharif Medical Hospital Lahore. Known cases with the already diagnosed patients of both genders, of the age twelve and above, were assessed and enrolled in this research study. Diagnosis constraints of liver cirrhosis were also known on the basis of medical (lessened span of the liver <8 cm on medical test with splenomegaly and ascites), biological (extended time of prothrombin >12 seconds and deficient serum albumin level <3.5g/dl), radiological (enhanced echo from, pinched liver <8 cm in the middle clavicular line, diameter of portal vein >1.3 cm and size of spleen>13 cm in longitude aspect) and renewing nodules, destruction of central vein and existence of extensive fibrosis were as previous biopsy. The complete medical examination was held for all the patients. Through the assessment of the occurrence of the lower level of serum zinc in liver cirrhosis (64%), the samples were calculated with the error margin of 5% [13]. Child-Pugh Score was utilized for assessing the intensity of liver cirrhosis and ELISA method was used for detection of the infections Hepatitis B and Hepatitis C [14]. The unstable liver cirrhotic patients were admitted, blood samples were taken from them for assessing the serum zinc level. The normal range of serum zinc level lies among 11-19mmol/L so, the range value < 11mmol/L was taken as deficient [15]. All patients were informed about the procedure and methodologies of the research study and an informed consent was taken from them before the start of the study. Necessary approvals were taken from the ethical board of the hospital.

Expert advisor physicians analyzed the serum zinc level and approved its status as deficient as the normal range was indicating deficient serum level [15]. The patients having less interest, noncooperation, and refusing consequent were excluded from the study. The patients previously on zinc therapy, chemotherapy of cancer, with acute or chronic diarrhoea, previously on hormonal therapy, with the history of pregnancy, autoimmune illness and immunodeficiency complaint (Granulocytopenia<500/mm3 CD4+count<200), were also excluded from the study. SPSS software was used for statistical data analysis. The serum zinc shortage variable was noted from numeric to categorical i. e. the usual and lower level. The authentic data comprising over frequencies and deficiencies like as the gender and the level of zinc serum was symbolized as n (%). Fisher's exact (2/2 test of X2 was provided for comparing proportions. Student t-test was utilized for comparing the means amongst the gender and level of serum zinc. Standard nonconformity + mean value was intended amongst the numerical variables. The data was planned over 95% interval of confidence. The P value <0.05 was taken as statistically important level, For all the contrasts.

RESULTS:

A total number of One hundred and twenty-seven patients with liver cirrhosis were analyzed with the average age 43±15 (SD). In the follow-up appointment serum, zinc level was observed in 85% (108) patients and 16% (20) patients were found unstable and were hospitalized for the assessment of serum zinc level. In 70% (89) patients serum zinc level was deficient and in remaining, 30% (38) patients were possessing normal serum zinc level. The zinc-deficient patients were 12% (15) in class A, 16% (20) in class B and 72% (92) in class C. The 94% (119) participants were having the history of the Hepatitis C infection, 4% (05) patients were possessing Hepatitis B virus infection and 2% (03) patients were found possessing the history of alcoholism. Only one patient was found with intense liver failure due to lower zinc level. The participant belonging to rural territory and urban territories were 82% (104) and 18% (23) respectively, belonging to borderline territories of the Punjab province.

Table – I: Gender Distribution

Gender	Low (88)		Normal (39)		Total (127)		P-Value
	Number	Percentage	Number	Percentage	Number	Percentage	
Male	49	55.7	12	30.8	61	48	0.01
Female	39	44.3	27	69.2	66	52	

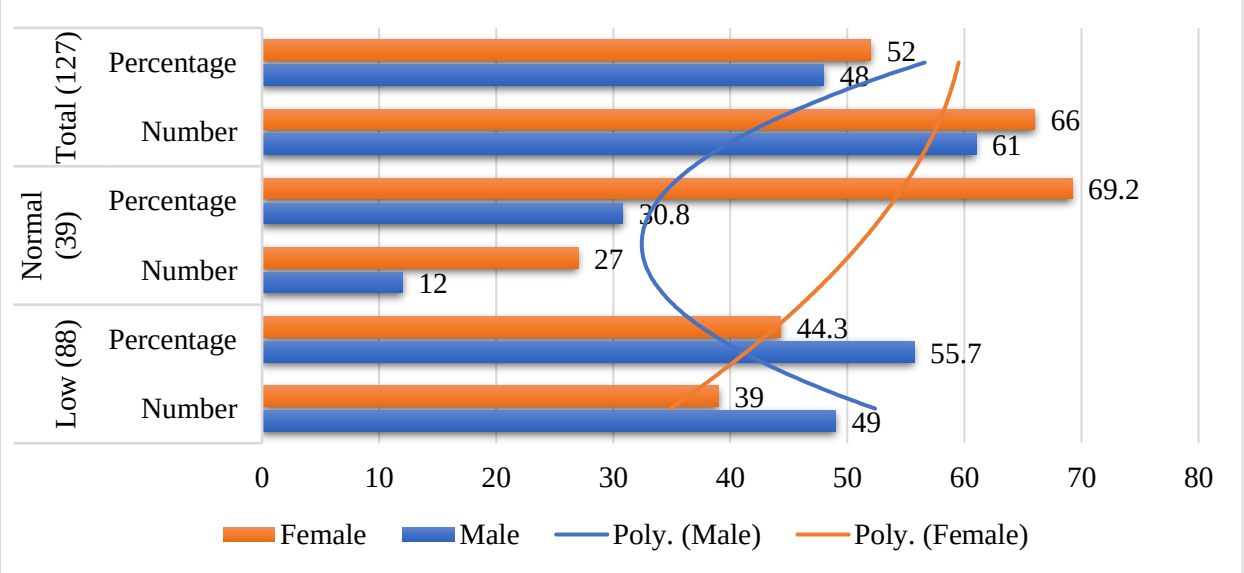


Table – II: Distribution of Zinc Levels (Mean and SD Values)

Low (88)		Normal (39)		P-Value
Mean	±SD	Mean	±SD	
8.034	1.14	13.025	0.76	< 0.001

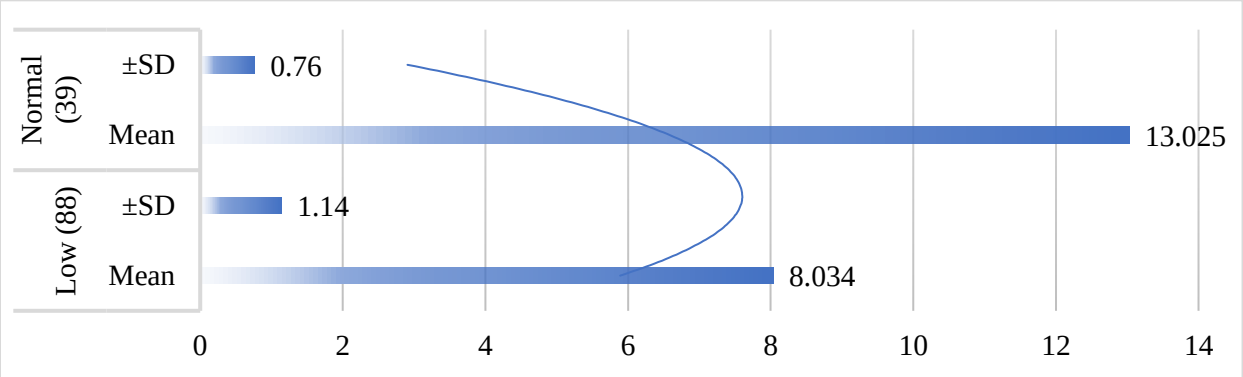
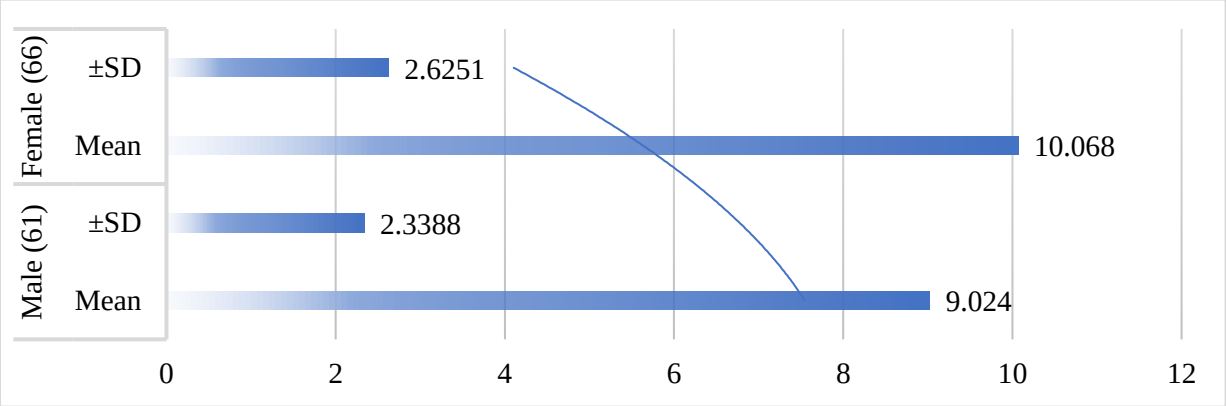


Table – III: Male and Female Distribution (Mean and SD Values)

Male (61)		Female (66)		P-Value
Mean	±SD	Mean	±SD	
9.024	2.3388	10.068	2.6251	0.02



DISCUSSION:

The liver has a very important role in the homeostasis of Zn and many sections of Zn have been identified for explaining kinetics of zinc in the human body. The liver offers a rapidly exchangeable pool of Zn which possesses a valuable part in the process of metabolism of Zn and many of the other suggesting elements [16]. Go et al. and Sullivan et al. have also stated the same observation related to deficiency of serum zinc level within the liver cirrhotic patients as our study presented [17, 18]. Kalkan et al. also recognized deficiency of zinc in the liver cirrhotic patients in his study published in the year 2002 [19]. The zinc is having a defensive effect contrary to the liver fibrosis and the consumption of Zn in cirrhosis depends upon observation of deficient Zn values within the patients of liver cirrhosis, and also on helpful zinc supplementation effects on liver metabolism [20, 21]. In our study 94% participant were having the infection of hepatitis C tempted

cirrhosis, the infection encouraged cirrhosis originates oxidative pressure furthermore, secondary cellular injury. Deficient plasma Zn concentration promotes oxidative strain and its replacement by higher doses are necessary to discuss here [22]. The replication of Hepatitis C virus infection can be directly affected through Zn, hence promoting functional and skeletal constancy of specific HCV protein such as NS3 and NS5A. Three patients were identified for liver cirrhosis with low serum zinc level due to alcoholism in our research study. Similar findings were there amongst the two studies comprising over the topics of Hepatic zinc content within patients with many stages of the alcoholic liver disease and in chronic active and chronic persistent hepatitis patients [23]. Research studies in animal models have indicated that supplementation of zinc avoided ethanol-induced injury of the liver within chronic and acute conditions of exposure. Ethanol-induced hepatic Zn depletion is decreased, raised cytosome (P450 2E1) action is suppressed and alcohol dehydrogenase is enhanced due to supplementation of Zn. alcohol dehydrogenase is also responsible for ethanol-induced oxidative stress suppression. Hepatic glutathione is also increased due to administration and related antioxidant dimensions of Zn [24]. The average age of the patient with liver cirrhotic in our study was 42 ± 15 and it resembles with the age range of the study presented by Bhise et al [25]. Our study also resembles in the perspective of, the majority of rural population indicating zinc-deficient patients, with the study presented by Ma et al on "assessment of intake inadequacy and food sources of zinc of people in China" published in the year 2007 [26]. In the study presented by Dario et al there was no diversity in Zn concentration among the male and female liver cirrhosis patients but in our study in the gender perspective, the male prevalence was obvious within relation to disturbance of Zinc among liver cirrhosis. One patient was found with intensive liver failure regarding deficient serum zinc level as it was also found within the study presented by Chetri et al [28]. Along with hepatic encephalopathy and the intense hepatic failure, constraints related to biochemical, suggesting dysfunction of liver giving opposite connection with levels of serum Zn. The Hepatitis B virus infection induced liver cirrhosis was detected among 4% patients in our study and their zinc level was also deficient but in the study by Gur et al, it was stated that levels of hepatic and serum Zn were deficient in the Hepatitis B virus-induced cirrhosis patients [29]. Enhanced urinary loss, malnourishment, hypoalbuminemia, portosystemic thrusts, deficient intestinal Zn intake are the main cause behind depletion of Zn in cirrhosis. Many studied have highlighted that absorption of Zn was deficient in the patients with cirrhosis. For the Zn malabsorption in liver cirrhosis, two processes were suggested (1) Small bowel mucosa injury (2) Pancreatic exocrine functional losses combined with deficient ligands synthesis like picolinic acid within liver [30]. Many medical elements of cirrhosis in liver, like loss of hair, testicular atrophy, night blindness, delayed healing of the wound, less appetite, reduced smell, and taste acuity, infections susceptibility, greater drug sensitivity, and deficient performances related to neurocognition can be connected with the deficiency of zinc. In few cases, Zn supplementation was found helpful for the patients [31]. The supplementation of Zn lessened irritation and resolute it rapidly So, there is the need for the improvement in knowledge and information in future studies concerning clinical workup for the liver cirrhosis patients.

CONCLUSION:

The cirrhosis patients were having the deficiency of serum zinc level. It is therefore recommended that a regular zinc status biochemical assessment is mandatory in the patients diagnosed with liver cirrhosis in order to control disease progression and management of the disease.

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