ORIGINAL RESEARCH

Association of detectable micro element among chronic alcoholic disease patients in central India

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ABSTRACT
Introduction: Chronic alcohol use causes general malnutrition, which is primarily caused by gastrointestinal dysfunction and malabsorption, which affects the electrolyte balance and the amounts of trace elements in the serum and tissues**Methodology:** The Department of Biochemistry at Index Medical College Hospital and Research Centre in Indore conducted the current study. Patients between the ages of 30 and 60 with persistent alcoholic disease were identified using WHO guidelines after gaining ethical approval and informed consent.**Result:** In its outpatient department (OPD), the Index Medical College Hospital and Research Centre in Indore contained 62 adult subjects. In terms of sex, there were 54 male and female patients out of the total. The patients were divided into four groups based on their age range, which was between 30 and 60. ALD is most prevalent in patients of both sexes between the ages of 35 and 40.**Conclusion:** When patients with alcoholic liver disease were compared to normal healthy persons, our study found a significant drop in serum magnesium and zinc levels.When compared between individuals with alcoholic liver disease and healthy people, the serum copper level also increased significantly.
Key words:ALD, Mg, Cu and Zn

INTRODUCTION

Mineral elements known as trace elements can be found in trace amounts in the human body. These include the minerals Magnesium (Mg)cobalt (Co), copper (Cu), iron (Fe), selenium (Se), and zinc (Zn), all of which are necessary for a variety of cellular, immunological, and physiological processes. The World Health Organisation has investigated healthy dietary needs and has set daily intake recommendations [1].

Numerous studies have attempted to examine the anomalies of trace elements in cirrhotic individuals [2]. Several authors [3-6] discovered abnormalities in trace elements (copper, zinc, manganeseand magnesium).

Chronic alcohol use causes general malnutrition, which is primarily caused by gastrointestinal dysfunction and malabsorption, which affects the electrolyte balance and the amounts of trace elements in the serum and tissues [7,8]. Chronic alcohol use has been linked to changes in the concentration of trace elements in different tissues, according to a number of reports [9,10].

The significance of trace elements in pathogenesis of liver cirrhosis and its consequences is still not fully known [11]. This study was carried out to examine trace elements in patients with liver cirrhosis and to determine their association with disease severity.

MATERIAL METHOD

The Department of Biochemistry at Index Medical College Hospital and Research Centre in Indore conducted the current study. Patients between the ages of 30 and 60 with persistent alcoholic disease were identified using WHO guidelines after gaining ethical approval and informed consent.

All clinically questionable patients who visited our outpatient department (OPD) between 2019 and 2020 and displayed typical illness symptoms, such as fever, diarrhoea, skin disorders, etc., were selected for the study. A total of 31 cases of clinically proven ALD were found in heavy alcohol users between the ages of

30 and 60. ALD was recognised using clinical and biochemical data.

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On an atomic absorption spectrophotometer (model-AAS4141 by ECIL), serum zinc, copper, and magnesium were measured. Five Part XT 1800 I Sysmex underwent a full haemogram.

The mean and standard deviation of each finding were provided. One-way analysis of variance (ANOVA) was used to analyse the significance of the differences between all the parameters for the controls and the patients, and a p value of 0.05 was used to represent statistical significance. The statistical study made use of the student T test.

Result

Table 1: Comparison of Mean Magnesium Between Groups

Variable	Group	N	Mean	Std. Deviation	T test	P Value	Result
Magnesium	Case	31	1.4487	0.27489	-5.040	0.000	Sig
	Control	31	1.7903	0.25853			

This above table shows the comparison of mean Magnesium between case and control groups.

T-test was applied to compare the difference between the mean value among Case Group and Control Group which was found to be statistically significant (p<0.05).

The mean value 1.4487 was for case group was significantly lower than the mean value 1.7903 was for control group.

Table 2: Comparison of Mean ZINC Between Groups

Variable	Group	N	Mean	Std. Deviation	T test	P Value	Result
ZINC	Case	31	66.194	27.2763	-4.884	0.000	Sig
	Control	31	94.735	17.7376			

This above table shows the comparison of mean ZINC between case and control groups.

T-test was applied to compare the difference between the mean value among Case Group and Control Group which was found to be statistically significant (p<0.05).

The mean value 66.194 was for case group was significantly lower than the mean value 94.735 was for control group.

Table 3: Comparison of Mean COPPER Between Groups

Variable	Group	N	Mean	Std. Deviation	T test	P Value	Result
Copper	Case	31	142.942	34.6443	5.066	0.000	Sig
	Control	31	104.200	24.7515			

This above table shows the comparison of mean COPPER between case and control groups.

T-test was applied to compare the difference between the mean value among Case Group and Control Group which was found to be statistically significant (p<0.05).

The mean value 142.942 was for case group was significantly higher than the mean value 104.200 was for control group.

Table 4: Association Between Study Group and Age Group

Age Group			Group		Total
			Case	Control	
AGES	30-35 Years	N	5	9	14
		%	16.1%	29.0%	22.6%
	36-40 Years	N	9	4	13
		%	29.0%	12.9%	21.0%
	41-45 Years	N	13	12	25
		%	41.9%	38.7%	40.3%
	>=46 Years	N	4	6	10
		%	12.9%	19.4%	16.1%
Total		N	31	31	62
		%	100.0%	100.0%	100.0%

Mean ± S.D.	41.48±5.40	40.97±6.621	Non-Sig
T Test	0.336		
P Value	0.738		

The above table shows the association and comparison of mean age between Study Group and Age Group.
Independent t test was applied to compare the mean age, which shows that there was non-significant difference between Study Group (P>0.05).
For CASE Group, the highest proportion 41.9% was for 41-45 years and the lowest proportion 12.9% was for >=46 years. The mean age was found to be 41.48 years.
Whereas for CONTROL Group, the highest proportion 38.7% was for 41-45 years and the lowest proportion 12.9% was for 36-40 years.
The mean age of case group was found to be 41.48 years and that of control group was 40.97 years.

Table 5: Association Between Study Group and Weight

Weight			Group		Total
			Case	**Control**	
Weight	51-60 Kg	N	6	8	14
		%	19.4%	25.8%	22.6%
	61-70 Kg	N	21	22	43
		%	67.7%	71.0%	69.4%
	71-80 Kg	N	4	1	5
		%	12.9%	3.2%	8.1%
Total		N	31	31	62
		%	100.0%	100.0%	100.0%
Mean ± S.D.			64.39±6.34	62.77±6.30	Non-Sig
T Test			1.004		
P Value			0.319		

The above table shows the distribution and comparison of mean weight between Study Groups.
Independent t test was applied to compare the mean weight, which shows that there was non-significant difference between Study Group (P>0.05).
For CASE Group, the highest proportion 67.7% was for 61-70 Kg and the lowest proportion 12.9% was for 71-80 Kg.
Whereas for CONTROL Group, the highest proportion 71.0% was for 61-70 Kg and the lowest proportion 3.2% was for 71-80 Kg.
The mean weight of case group was found to be 64.39 Kg and that of control group was 62.77 Kg.

DISCUSSION

Table 1 shows the comparison of mean Magnesium between case and control groups. T-test for Magnesium was applied to compare the difference between the mean value among Case Group (1.4487)and Control Group which was found(1.7903)to be statistically significant (*p*<0.05).
In contrast to healthy people, patients with liver cirrhosis have decreased serum magnesium levels, according to research by Biswajit Das, Prasanna Chandra, and colleagues. The results of that investigation are comparable to this conclusion. Low serum magnesium levels are brought on by a combination of decreased dietary intake and increased excretion of the metal because of the indirect effects of alcohol on the renal tubules. Inadequate dietary magnesium intake in the distal jejunum, the use of magnesium diuretics, and a decrease in plasma albumin levels are other variables that could cause hypomagnesemia[12].
Another study by Rocchi E, Borellia P, *et al.* discovered that the plasma level of magnesium is observed to be decreased [13].
In this study T-test for serum zinc was applied to compare the difference between the mean value among Case Group (66.194) and Control Group (94.735) which was found to be statistically significant (*p*<0.05).
According to a study by Dario Rahelic, Milan Kujundzic, *et al.*, patients with alcoholic liver cirrhosis exhibited lower serum zinc concentrations than controls. (P = 0.001; 0.82 mol/L vs 11.22 mol/L). Zinc levels were found to be lower, and this was linked to a decrease in protein intake, an increase in gastrointestinal loss due to diarrhoea or intestinal malabsorption, and an increase in urine losses. Protein deficits are widespread as a result of poor dietary intake[14].
Lower levels of zinc were also seen in patients with liver cirrhosis, according to another study by Soomro AA, Devrajani BR, *et al.*,[15].
According to a different study by Triwikatmani C, Bayupurnama P, *et al.*, 66.7% of persons with liver cirrhosis experience hypozincemia. Numerous factors, such as protein limitation that worsens low meal intake, poor intestinal absorption, impaired albumin binding, and increased urine loss, may have

contributed to the overall body's zinc content declining [16].

Comparing cases with a mean value of 142.942 g/dl to controls with a mean value of 104.200 g/dl, there is a substantial increase in copper in cases with a significant p value of 0.001.

This result is in line with findings from a study by Dario Rahelic, Milan Kujundzicand colleagues that showed those with liver cirrhosis had significantly greater serum copper concentrations than the control group. The scenario was explained in terms of copper's role in the redox process. The redox cycling between cu2+ and cu1+ can catalyse the production of harmful hydroxyl radicals. It is widely known that oxidative stress and redox processes play a crucial part in the development of liver cirrhosis.

The interaction between zinc and copper during intestinal absorption, as well as their competition for binding sites on carrier proteins and cellular uptake, may have an impact on the control of their homeostasis. This may assist to explain why the amounts of zinc and copper are opposite [14].

Conclusion

When patients with alcoholic liver disease were compared to normal healthy persons, our study found a significant drop in serum magnesium and zinc levels.

When compared between individuals with alcoholic liver disease and healthy people, the serum copper level also increased significantly.

Although hypomagnesemia is not a laboratory sign of fatty liver, because of its link to elevated oxidative stress, it may be a risk factor in the development of fatty liver to steatohepatitis.

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