ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 02 | February - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# IMPORTANT ROLE OF TRACE ELEMENTS (MG AND ZN) IN THE SERUM OF PATIENTS SUFFERING FROM NON-ALCOHOLIC LIVER DISEASE AND COMPARE THEIR LEVEL WITH HEALTHY SUBJECTS OF RAJASTHAN

**Biochemistry**

**Shalini Vyas*** Department of Biochemistry, Sardar Patel Medical College, Bikaner, Rajasthan, India. *Corresponding Author

**RK Vyas** Department of Biochemistry, Sardar Patel Medical College, Bikaner, Rajasthan, India.

**Hemlata Sharma** Department of Biochemistry, Sardar Patel Medical College, Bikaner, Rajasthan, India.

## ABSTRACT

Liver is the largest major organ of our body. liver having a wide range of functions so, it is prone to many diseases which are very commonly seen in India. Any disturbance of liver function that causes illness is called liver disease. It is also known as hepatic disease. It is major leading cause of morbidity and mortality worldwide. **Aim** of this study was to find out the role of Trace Elements (Mg & Zn) levels in diagnosis of Non-alcoholic liver disease. **Material and methods:** 200 subjects were selected out of them 100 were selected as study group (Non-alcoholic (NALD) and 100 were selected as control group and distributed according to their age and sex. Trace elements were estimated by Atomic adsorption spectrophotometer (AAS). **Result:** the serum trace elements level was decreased in non-alcoholic liver disease patients. P-value was found to be significant when compared with healthy subjects. ($P \leq 0.001$). **Conclusion:** We came to the conclusion that serum level trace elements (Mg, Zn) activity looks specific and can be used for prognostic evolution of non-alcoholic liver disease.

## KEYWORDS

Trace Elements (Mg & Zn), AAS (Atomic adsorption spectrophotometer), NALD (non-alcoholic liver disease)

## INTRODUCTION:

Liver disease is common term for any injury that reduces the proper functioning of the liver. The liver shares with several alternative abilities to perform its functions with in depth reserve capability as it is A most vital organ of body. Multiple functions are performed by Liver[1]. Liver is answerable for a variety of significant functions which incorporates blood detoxification, purification, plasma proteins synthesis, production of digestive fluid, and also the carbohydrates, fats and proteins metabolism[2].

NAFLD encompasses a spectrum of liver conditions that occur in individuals who do not take alcohol or who consume ethyl alcohol but in amounts regarded as insufficient to cause liver damage. Histologically, it is indistinguishable from alcoholic fatty liver disease. At one end of this spectrum is accumulation of fat in the liver or simple steatosis. This is followed by the more severe form of the disease, non-alcoholic steatohepatitis (NASH) which is characterized by the +nce of inflammation. While simple steatosis is generally considered benign, NASH can lead to fibrosis and later on cirrhosis with high risk of liver-related disease and hepatocellular carcinoma[3] (Ekstedt et al., 2006; Sanyal et al., 2006) (Figure 2.1).

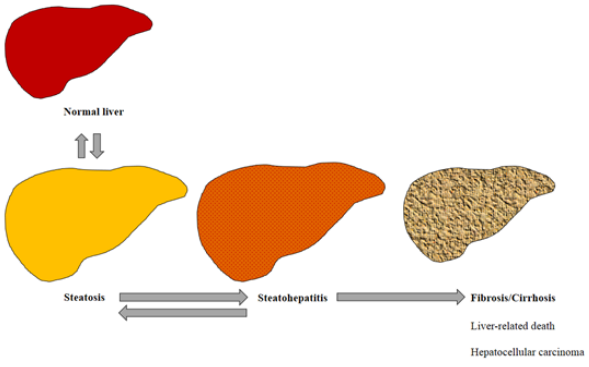


**Figure 2.1 The spectrum of NAFLD**

### Diagnosis of NAFLD

Most patients with NAFLD are asymptomatic. Some may have non-specific symptoms e.g. fatigue. The diagnosis of NAFLD is often suspected from elevated serum aminotransferase level in patients with metabolic syndrome. The diagnosis can be confirmed with USG and following exclusion of significant alcohol intake and other causes of chronic liver disease e.g. viral hepatitis B and C. NAFLD is also often incidentally diagnosed when patients undergo ultrasonography for unrelated indications. Patients with cirrhosis due to NAFLD present when they decompensate and in ways similar to patients with decompensated cirrhosis due to other reasons of chronic liver damage. Presentations include jaundice, ascites, ankle swelling, bleeding from esophageal varices, hepatic encephalopathy and hepatocellular carcinoma.[4]

## MATERIALS AND METHODS:

The present study was enrolled with 200 subjects (aged between 30-70 years of both sexes) in the Biochemistry Department of Sardar Patel Medical College and Medicine and Gastroenterology Department of PBM hospital. 100 patients of non-alcoholic liver disease were clinically confirmed liver damage (by routine investigations, fibrin scan, and ultrasonography image) admitted in medicine wards. 100 normal healthy persons were selected as control group. Blood collected in a clean and dry test tube. Allow samples to clot for 2 hours at room temperature before centrifugation. Collect the supernatant and carried out the assay immediately. serum trace elements (Mg, Zn) were performed on AAS. Liver function tests are performed on Fully automated machine by commercially available kits.

**Design of Study-** our study analysis is the Case-control analytical study

**Setting-** This study was carried out in the Department of Biochemistry in collaboration with the Department of General medicine and Gastroenterology at Sardar Patel Medical College and Associated group of P.B.M. Hospitals, Bikaner. All participants completed a medical history form and provided information in consent form.

**Study Population-** Study included 200 subjects. 100 were study group and 100 were control group subjects clinically diagnosed liver damage non-alcoholic patients. Patients who presented in Medicine and Gastro Departments of PBM hospital with history suspicious of liver damage and their liver function tests are abnormal, their fibrosis were diagnosed with fibrin scan. In this study 55% patients were males and 45% were females.

**Study Period & Study Approval-** Present study was done from year 2016 to 2019. The Institutional Ethical Committee at the Sardar Patel Medical College and Associated Group of P.B.M. Hospitals, Bikaner, Rajasthan, India approved the study. The Developmental Research Committee at the Rajasthan University of Health Sciences, Jaipur, India conjointly approved the study.

**Study Protocol-** The following criteria are undertaken for the selection of the patients in the study: -

**Inclusion criteria**: the patients having abnormal liver functions test with impairs radiological finding with physician confirmation were included in this study. Controls were healthy individuals, age and sex matched without any major illness.

**Exclusion Criteria:** The patients with age between 30-70 years,

having acute infection, chronic malnutrition deficiency disease, poisoning from organophosphates, had been excluded. Pregnant female or using oral contraceptive pills and patients taking drugs such affecting the levels of trace elements and antioxidant status were excluded from the study.

**OBSERVATION TABLES:**

**Table No.-1**

**Socio -demographical details of non- alcoholic liver disease group with the control group**

| S.No. | Characteristics | Control subjects | Non-alcoholic liver disease (NALD) subjects (Cases) |
|---|---|---|---|
| 1. | No. of subjects (n) | 100 | 100 |
| 2. | Mean age(Years) | 49.2±10.36 | 54.28±10.23 |
| 3. | Sex | Male 62<br>Female 38 | Male 55<br>Female 45 |
| 4. | Area | Rural 15<br>Urban 85 | Rural 21<br>Urban 79 |
| 5. | Religion | Hindu 84<br>Muslims 16 | Hindu 81<br>Muslims 19 |
| 6. | Socioeconomic status | High 20<br>Middle 46<br>Low 13<br>BPL 21 | High 31<br>Middle 40<br>Low 14<br>BPL 15 |

**Table No.-2**

**Shows the Age wise composition of the Healthy control subjects with NALD group**

| S. No. | Age Group (In years) | Healthy control Subjects | NALD GROUP |
|---|---|---|---|
| | | No. of subjects | |
| 1 | 30-40 | 22 | 12 |
| 2 | 41-50 | 33 | 22 |
| 3 | 51-60 | 29 | 35 |
| 4 | 61-70 | 16 | 31 |
| | Total | 100 | 100 |

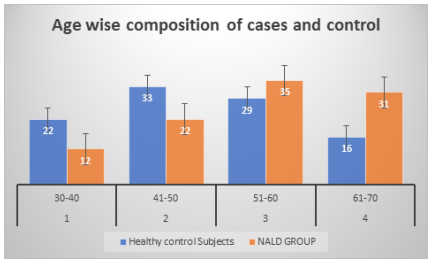


**FIGURE-1 Age wise composition of the Healthy control subjects with NALD group**

**Table No.-3**

**Comparison of routine biochemical parameters (LFT's) of non-alcoholic liver disease group with the control group**

| Parameters | Non-Alcoholic liver disease (n=100) | Control (n=100) | P value |
|---|---|---|---|
| Serum bilirubin (Total) | 2.47±1.67 | 0.9±0.24 | <0.0001 |
| Serum bilirubin (Direct) | 1.28±1.04 | 0.2±0.08 | <0.0001 |
| Serum AST (SGOT) | 112.57±80.18 | 29.46±5.79 | <0.0001 |
| Serum ALT (SGPT) | 131.08±95.23 | 37.98±8.48 | <0.0001 |
| Serum ALP | 274.66±100.90 | 122.38±33.09 | <0.0001 |

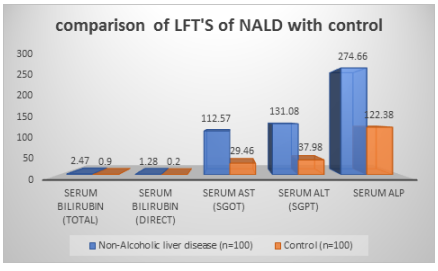


**Figure-2 Comparison of routine biochemical parameters (LFT's) of non-alcoholic liver disease group with the control group**

**Table No.-4**

**Comparison of Trace elements (Mg & Zn) of non-alcoholic liver disease group with the control group**

| Parameters | Non-Alcoholic liver disease (n=100) | Control (n=100) | P value |
|---|---|---|---|
| Serum Mg | 1.43±0.26 | 2.14±0.34 | <0.0001 |
| Serum Zn | 63.78±22.53 | 101.52±19.77 | <0.0001 |

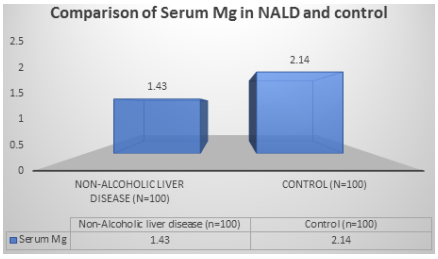


**figure-3-Comparison of Trace elements Mg of non-alcoholic liver disease group with the control group**

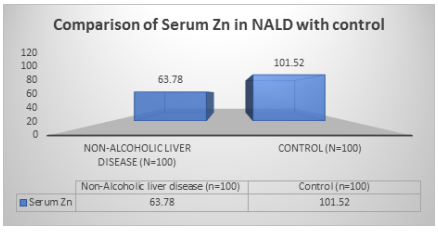


**figure-4-Comparison of Trace elements Zn of non-alcoholic liver disease group with the control group**

**DISCUSSION-**

Table 1 Shows the Socio -demographical details of non-alcoholic liver disease group with the control group.

Table 2 and figure 2 Shows the Age wise composition of the Healthy control subjects with NALD group

Table 3 and figure 3– Shows comparison of Bilirubin, AST, ALT, ALP and Trace elements (Mg and Zn) in cases and control group. Total Bilirubin is raised in cases with mean value of 2.47± 1.67 mg/dl when compared with controls with mean value of 0.9±0.24 mg/dl. There is significant rise in bilirubin with p value 0.0001. Direct Bilirubin is also raised in cases with mean value of 1.28± 1.04 mg/dl when compared with controls with mean value of 0.2±0.08 mg/dl. There is significant rise in bilirubin with p value 0.0001. AST is increased in cases with mean value of 112.57±80.18 IU/L when compared with controls with mean of 29.46±5.79 IU/L. p value is < 0.0001 which is significant. ALT is increased in cases with mean value of 131.08±95.23 IU/L when compared to controls with mean value of 37.98±8.48 IU/L. p value is 0.0001 which is significant.

Table no. 4 and figure 3 & 4 Shows the comparison of magnesium and zinc in cases. Serum magnesium is reduced in cases with mean value of 1.43±0.26 mg/dl when compared with controls with mean value of 2.14±0.34 mg/dl. p value is < 0.0001which is significant.

Serum zinc concentration is reduced in cases with mean value of 63.78±22.53 µg/dl when compared with controls with mean value of 101.52±19.77µg/dl. p value is < 0.0001which is significant.

Low levels of zinc were explained with low ingestion due to protein reluctance, increased loss in gastrointestinal system due to diarrhea or intestinal malabsorption and increased urinary losses. Protein deficiency occurs frequently due to poor dietary intake.[6]

**SUMMARY-**

This study conducted in Sardar Patel medical college and hospital includes diagnosed cases of non-alcoholic liver disease between the age group 30 - 70 years. A total of 200 subjects were taken, out of which 100 are cases and 100 are controls. Serum Magnesium and Zinc are determined in patients with non-alcoholic liver disease and compared with controls. This study shows that there is a significant change in trace elements in patients with non-alcoholic liver disease when compared with controls.

**RESULTS:**

The Serum trace level were decreased in non-alcoholic liver disease patients. The mean value of serum Mg of non-alcoholic patients was 1.43±0.26, and 2.14± 0.34 in control group. The mean value of serum Zn of non-alcoholic patients was 63.78±22.53 and 101.52±19.77 in control group. P-value was found to be highly significant when compared with healthy subjects. ($P \leq 0.0001$).

**CONCLUSION:**

Detection of trace elements in non-alcoholic liver disease might be helpful in the early diagnosis of the disease, management protocol and to reduce the progression of disease. We came to the conclusion that serum level of trace elements (Mg, Zn) activity looks specific and can be used for prognosis of non-Alcoholic liver disease. Further research is encouraged to determine the efficacy of applying these biomarkers for diagnosis and treatment in a clinical setting. In conclusion, our study showed that lower Zn and Mg concentrations related to a rise in liver disease severity. Therefore, Zn and Mg ought to be enclosed among the micronutrients that are given specific thought within the management of liver disease so as to forestall zinc and magnesium deficiency and will be used as a sensitive indicator of non-alcoholic liver cirrhosis. A routine assessment of Zn and Mg in non-alcoholic liver disease patients could also be effective in management protocol and to scale back progression of the disease and avoid important derangements within the health standing.

**ACKNOWLEDGEMENTS:**

Dr. R.K. Vyas, Sr. Professor & Head, is the guarantor of this work and, as such, he had full access to all the data in present study and takes responsibility for the loyalty of the data and the accuracy of the data analysis. This work was supported by Dr. R.P. Agarwal, Principal, Dr. Aashish Joshi Sardar Patel Medical College, Bikaner.

**REFERENCES:**

1. Marsano LS, Mendez C, Hill D, Barve S, McClain CJ. Diagnosis and Treatment of alcoholic liver disease and Its complications. Alcohol Research & Health. 2003;279(3):248-56.
2. Nagato AC, Silva MAS, Trajano ETL, Alves JN, Bandeira ACB, Ferreira TA, et al. Quantitative and morphological analyses of different types of human liver. J Morphol Sci. 2011;28(4):275-79.
3. Ekstedt, M., Franzen, L. E., Mathiesen, U. L., Thorelius, L., Holmqvist, M., Bodemar, G., & Kechagias, S. (2006). Long-term follow-up of patients with NAFLD and elevated liver enzymes. Hepatology, 44(4), 865-873.
4. Sanyal, A. J., Chalasani, N., Kowdley, K. V., McCullough, A., Diehl, A. M., Bass, N. M., Nash, C. R. N. (2010). Pioglitazone, vitamin E, or placebo for nonalcoholic steatohepatitis. N Engl J Med, 362(18), 1675-1685.
5. Chan, W. K., Tan, A. T., Vethakkan S. R., Tah, P. C., Vijayananthan, A., & Goh, K. L. (2013). Non-alcoholic fatty liver disease (NAFLD) in diabetics – prevalence and predictive factors in a multi-racial hospital clinic population in Malaysia. J Gastroenterol Hepatol, 28(8), 1375-1383.
6. Dario Rahelic, Milan K, Zeljko R et al. Serum concentration of zinc, copper, manganese and magnesium in patients with liver cirrhosis. Coll. Antropol. 30(2006) 3:523 -528.