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Original Research Article

A Study of Serum Iron and TIBC in Patients with Chronic Alcoholic Liver Diseases in Tertiary Care Level Hospital, Ahmedabad

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Abstract

Background: Excessive alcohol consumption causes a wide variety of medical and social problems and a considerable economic burden. The liver is an important organ in iron homeostasis. Serum iron (SI), total iron binding capacity (TIBC) and ferritin levels are the principal tests used in the evaluation of iron burden. The aim of this study is to determine the changes in levels of iron and TIBC in chronic alcoholic liver diseases.

Materials and Methods: A cross-sectional study was done and included 100 individuals (50 chronic alcoholic liver diseases cases and 50 normal controls). Serum iron and TIBC were estimated by colorimetric method on fully automated chemistry analyzer.

Result: Data were fed under Microsoft Excel 2007 and statistically analyzed by GraphPad software; Version 6.0, which evaluated the differences of various parameters in both groups on the basis of p value. Serum iron level was significantly increased and serum TIBC level was significantly decreased in chronic alcoholic liver diseases patients as compared to normal healthy controls.

Conclusion: Iron and ethanol each cause oxidative stress and lipid peroxidation and the cumulative effects of ethanol and iron on liver cell damage, in patients with ALD, exacerbate liver injury. Therefore, iron overload is an independent factor of disease progression in hepatocellular carcinoma and it determines patients survival hence these parameters should be regularly monitored in chronic alcoholic liver diseases patients.

Keywords: Chronic alcoholic liver diseases**,** Serum Iron, Serum TIBC, Alcoholic liver diseases (ALD).

Introduction

Excessive alcohol consumption causes a wide variety of medical and social problems and a considerable economic burden [1]. The clinical signs of alcohol abuse are rather minimal in the early phase of this process while most of the signs arise later after several years of excessive drinking. The diagnosis of excessive alcohol consumption is often based on patients' own reports and answers to questionnaires. This approach suffers from a lack of reliability, because patients are usually unwilling to show excessive drinking. So there are some biochemical substances in the body that can indicate the presence or progress of a condition or any genetic predisposition toward it called “Biomarkers” [2]. The liver is an important organ in iron homeostasis. Besides its involvement in iron storage, the liver also produces transferrin and hepcidin, an iron carrier protein in plasma and a hormone regulating iron metabolism, respectively. Another aspect of the relationship between iron and the liver is that this organ is one of the main targets in hemochromatosis. Serum iron (SI), total iron binding capacity (TIBC) and ferritin levels are the principal tests used in the evaluation of iron burden [3]. Alcohol use can lead to either iron deficiency or excessively high levels of iron in the body. In many alcoholic patients, blood loss and subsequent iron deficiency are caused by gastrointestinal bleeding [4].

Materials and Methods

Study setting, type and sample size: In the present cross-sectional study, 50 cases of chronic alcoholic liver disease and 50 controls of normal healthy subjects were selected from Civil Hospital and B. J. Medical College, Ahmedabad, Gujarat. The study was conducted during the period of November 2015 to February 2017.

All patients were primarily evaluated by clinical examination and then confirmed by investigations for liver involvement due to alcoholism.

Study Groups:

- Group 1 (Cases) – Chronic Alcoholic Liver Disease patients (50)
- Group 2 (Controls) – Normal healthy subjects (50)

Inclusion Criteria for Group 1 (Cases):

- Age: - 20 to 60 years
- Sex: - Males
- Patient with continuous alcohol consumption.
- Patients with clinical evidence of alcoholic liver dysfunction.

Inclusion Criteria for Group 2 (Controls):

- Age: - 20 to 60 years
- Sex: - Males
- Samples of fifty normal healthy volunteer individual (No clinical evidence of any disease)

Exclusion Criteria for Both Groups:

- Age < 20 or >60 years
- Athletes
- Clinical Evidence of current illness
- Clinical evidence of any chronic infection
- Smoking had not been allowed 1 hour prior to blood sample collection
- Protein energy malnutrition
- Post-operative patient
- Patient taking anticonvulsant therapy (Benzodiazepines, Phenobarbitone)

Sample Collection: Venous blood was collected in clot activator serum vacutte from all the patients and control group by venepuncture. Serum was separated by centrifugation and analysis was done on Fully Automated Biochemistry Analyzer-Erba XL-640 at Hi-tech Clinical Chemistry Laboratory Services, Civil Hospital, and Ahmedabad. Commercially available ready to use reagent kits were used for estimation of various parameters. Following Laboratory Investigations were done in both the study groups.

Laboratory Investigations:

Serum Iron: Ferrozine method.

Reference range: Men: 70-180 µg/dl Women: 60-180 µg/dl.

Serum TIBC (Total Iron Binding Capacity): Iron exchange method.

Reference range: 274-385µg/dl.

Statistical Analysis: Data was entered under Microsoft Excel 2007 and epi info 7. Demographic data analysis was performed and unpaired t-test was used to show the significance of serum Iron and TIBC levels between cases and controls. The entire data were analyzed using the software GraphPad.

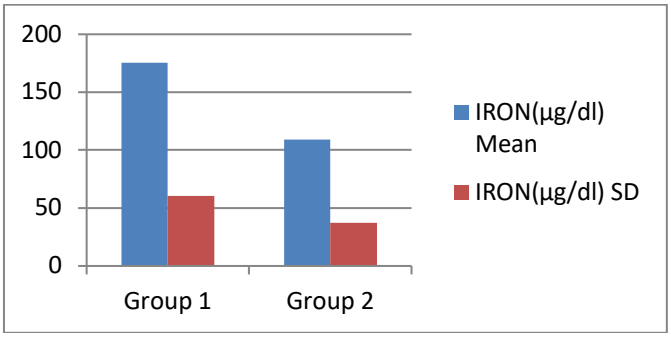
A p-value of <0.05 - statistically significant, p-value <0.001 - highly significant and p ≥ 0.05 – No significant difference.

Results

Table 1: Comparison of Mean activity of serum Iron in Study Group (Group 1) & Control group (group 2)

Serum Iron (µg/dl)		
Group	**Mean±SD**	**P value**
Study Group (group 1)	175.43±60.25	<0.001
Control group (group 2)	108.88±36.98	

Table 1 shows that serum Iron is increased in Study group as compared to control group (175.43±60.25µg/dl, 108.88±36.98 µg/dl respectively). So, there is highly significant difference observed in between study group and control group of serum Iron (p<0.001).

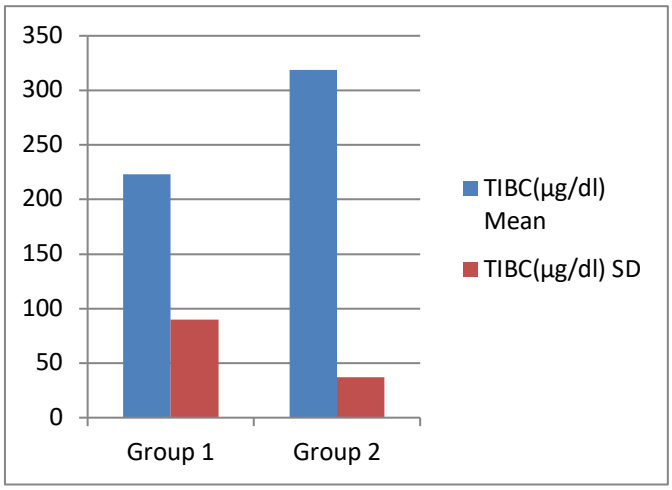


Graphs 1: Showing comparison of Mean and SD of serum Iron in Study group (Group 1) & Control group (Group 2)

Table 2: Comparison of Mean activity of serum TIBC in Study Group (group 1) & Control group (group 2)

Serum TIBC (µg/dl)		
Group	**Mean±SD**	**P value**
Study Group (group 1)	223.06±90.11	<0.001
Control group (group 2)	318.64±37.30	

Table 2 shows that serum TIBC is decreased in Study group as compared to control group (223.06±90.11 µg/dl, 318.64±37.30 µg/dl respectively). So, there is highly significant difference observed in between study group and control group of serum TIBC (p<0.001).



Graph 2: Showing comparison of Mean and SD of serum TIBC in Study group (Group 1) & Control group (Group 2)

Discussion

The liver is particularly vulnerable to diseases related to heavy drinking, most commonly termed as alcoholic hepatitis or cirrhosis. The progression of alcoholic liver disease is characterized by steatosis, inflammation, necrosis and cirrhosis or even death in severe cases [5]. Chronic consumption of alcoholic beverages is a primary cause of liver injury [6]. Hence, an attempt has been made to evaluate the effect of chronic alcohol consumption on parameters, which can be affected by liver injury like Iron and TIBC.

Iron and ethanol each cause oxidative stress and lipid peroxidation and the cumulative effects of ethanol and iron on liver cell damage, in patients with ALD, exacerbate liver injury. Therefore, iron overload is an independent factor of disease progression in hepatocellular carcinoma, and it determines patient survival [7,8]. Chronic alcohol consumption in moderate to excessive amounts can result in increased hepatic iron stores. In this study, serum Iron & TIBC level in study group and control group correlated well with the study done by Dr Shivam Khare et al (2015) [3].

Conclusion

The present study was aimed to evaluate the changes in serum Iron and TIBC in patients with chronic alcoholic liver diseases.

Level of serum Iron was significantly increased and level of Serum TIBC was significantly decreased in chronic alcoholic liver diseases as compared to normal individuals.

Regular monitoring of iron and TIBC especially in alcoholic patients is necessary for better patient management and to minimize the morbidity and mortality related to liver injury.

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Author Contribution

Study concept and design, acquisition of data, analysis and interpretation of data, drafting of the manuscript, critical revision of the manuscript for important intellectual content: R M, P G and S M

Statistical analysis: S M Administrative, technical and material supports: R M, P G and S M

Ethical Clearance

Ethical clearance permission taken from institutional ethics committee of B.J. Medical College and Civil Hospital, Ahmedabad. (Ref. No. IEC/Certi/42/17 on 8th May, 2017)

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