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SCREENING OF LIVER DISEASES IN THE SUBJECTS BELONGING TO THE URBAN AREA WITH SERUM SGOT, SGPT, BILIRUBIN, TOTAL PROTEIN, IRON AND CALCIUM

Medical Biochemistry

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ABSTRACT

Liver Function Tests are used to categorize hepatic dysfunction, severity of hepatic disease, and for the follow-up of liver diseases. Liver disease is any condition that causes liver inflammation or tissue damage and affects liver function. The aim of the study was the evaluation of serum iron and calcium parameters in patients with liver function test and analysis of the relationships between serum level of iron and calcium in women and men according to age in group's examined. Therefore, this study was carried out to investigate serum iron and calcium with bilirubin, total protein, SGOT and SGPT status in liver inflammation. The blood samples were analyzed for serum iron, calcium, total protein, bilirubin SGOT and SGPT level. Significantly decreased levels of serum total protein, iron, calcium and increased level of serum total bilirubin SGOT and SGPT ($p<0.001$).

KEYWORDS

INTRODUCTION

The liver is the main body site for iron stores and central in the regulation of iron homeostasis.1 Iron is an essential micronutrient of almost all organisms, which is involved in many metabolic processes. Disorders of serum iron balance that relate mainly to its deficiency are frequently observed in patients with liver diseases. 2 Plasma bilirubin, protein measurements are used to evaluate hepatocellular function and integrity and bile duct patency.3 Calcium has not previously been recognized as a complication of advanced chronic liver diseases.4 Serum parameters of calcium metabolism were measured in patients with liver diseases.5 Investigations were done to study the calcium metabolic changes in patients with hepatic diseases.6 Systematic biochemical and histopathological studies carried out in patients with diagnosed chronic liver diseases (cirrhosis, hepatocellular) confirm the important pathogenetic role of commonly occurring of iron level.7 The pathologic role of iron in the liver often accompanying metabolic disturbance syndrome like hypertension. Preliminary assessment of the incidence of iron metabolism disturbances in the population of patients with liver diseases. 7 The serum iron status of patients with various forms of hepatitis and cirrhosis of the liver and to determine the correlation between the degree of hepatocyte damage and the status of serum iron parameters. 8 High levels of SGOT in the blood indicate some type of liver inflammation like hepatitis, cancer.9 The SGOT(AST) and SGPT(ALT) are the enzymatic parameter of the liver function tests.10 ALT, a cytosolic enzyme is found in its highest concentrations in the liver and is more specific to the liver.11, 12 Any type of liver cell injury can reasonably increases ALT levels. 13The increase in ALT associated with hepatitis C infection tends to be more than that associated with hepatitis. 14

Various biochemical parameters that are presently determine in serum. Total protein, iron, calcium, SGOT and SGPT and bilirubin for the screening and diagnosis of liver disease as well as to alter mine the change that occurs in the metabolic process associated with the liver disease complication. The purpose of this research is to establish biochemical parameters for the screening and diagnosis of liver diseases and its complication with risk factors of iron, calcium. To determine the interrelationship of iron and other diagnosed parameter through them.

MATERIALS AND METHODS

This study was conducted at the Department of Biochemistry S.S. Medical College Rewa (M.P.) in the year 2014.

Source of data-

All the laboratory investigation was performed in patients. The study group compared of 111 subjects from 5-90 years of age in screening programme of liver disease, Patients was screened in central pathology lab of Biochemistry section of Biochemistry Dept. S.S. Medical College Rewa (M.P.) assigned for this study. Subjects' history was recorded for all the groups. Alcohol users, smokers, suffering from other diseases except liver diseases, HIV and cancer patients were excluded; women's used contraceptive tablets and all those taken supplements iron, calcium tablets were not incorporated in study.

Specimen collection and preparation/ collection of samples- Venous blood was collected from all subjects after 12 hours overnight fasting. 3ml of venous blood as sample was collected as routine diagnosis of the subjects and stored in a sterile vial. The blood was allowed to clot of room temperature. The clot was rimmed centrifuged; serum was separated by low-speed centrifugation and stored in a sterile vial. Hemolyzed and lipemic serum samples were rejected.

BIOCHEMICAL ANALYSIS-

Serum SGOT, SGPT, total protein, bilirubin, calcium and iron were estimated by colorimetric method. Present work was approved by institutional research ethical committee (Human Studies).

STATISTICAL ANALYSIS -

Mean and standard deviation were determined for each variable in all groups. All the results were expressed as mean ± SD. Student "t" test was used to assess statistical significance of the result within age and sex.

OBSERVATION

Table.1-The level of calcium, iron, total protein and bilirubin in different age groups-

Variables	Age group of 05-30 years		Age group of 31-60 yrs		Age group of 61-90 yrs	
	Male (n=20)	Female (n=15)	Male (n=22)	Female (n=17)	Male (n=25)	Female (n=12)
Serum Iron(mg/dl)	77.52± 17.85	73.31± 15.60	71.08± 25.40	68.21±12.80	66.27± 13.90	55.21±17.74
Serum Calcium(mg/dl)	8.0±2.16	7.7±3.19	7.3±2.61	6.7±1.34	6.5±1.21	5.0±1.70
Serum Total Bilirubin(mg/dl)	2.44±4.03	2.39±2.83	4.0±2.61	4.82±1.34	6.00±1.78	6.30±2.5
Total Protein (g/dl)	5.7±0.70	5.61± 3.6	4.0± 1.4	4.5± 2.3	3.7± 2.3	3.5±1.80
SGOT(IU/L)	72.28±66.21	70.5± 23.62	88.33±35.25	82.24± 60.34	100.25±43.5	94.50± 81.88
SGPT (IU/L)	82.88± 24.03	80.75± 36.45	110.91±25.71	100.25± 45.31	139.33±85.25	133.24±19.34

Table II-Corelation coefficient and significance in the study group.

parameter	Correlation coefficient	P value
Serum Bilirubin and Calcium	-0.80	P<0.001
Serum Bilirubin and iron	-0.78	P<0.001
Serum Bilirubin and Total protein	-0.88	P<0.001
Serum iron and serum calcium	+0.60	P<0.0001
Total protein and Iron	+0.72	P<0.001
Total protein and calcium	+0.63	P<0.0001

SGOT and Iron	-0.64	P<0.0001
SGPT and Iron	-0.68	P<0.0001

RESULT

The present study was done with an aim to screen the subjects 5-90 years of age in urban region for liver diseases. The serum iron level obtained was then correlated with other parameter with determined. descriptive statics of diagnostic parameters presented in Table I. There was a statistically significant decreased level of the serum total protein, calcium, iron and increased serum bilirubin level in all groups. Table II- Description about correlation coefficient and significance with diagnosed parameters in the study groups.

DISCUSSION

Screening and early detection are important since significant liver damage may occur with few or no symptoms. Abnormal LFTs may be the first indication of sub clinical liver disease and may thereby guide further diagnostic evaluation. Elevated serum amino-transferase levels associated with liver injury. Testing for aspartate aminotransferases (AST) or alanine aminotransferases (ALT) is part of many routine screening approaches. 15

Essentially the same liver tests may be ordered as a liver panel when someone has symptoms that may be due to liver injury or at risk for developing liver disease. These tests measure the levels of specific enzymes, bilirubin, and protein that are abnormal when liver injury is present. Tests such as bilirubin may also be ordered individually to monitor a person with a liver disease.16, 17 Hepatic irons has been described in hepatitis C virus (HCV) infection as an important cofactor of disease outcome.18 Iron may influence severity and progression of non-hemochromatotic liver diseases.19 Chronic hepatitis C presenting mild to moderate hepatic iron accumulation.20, 21 Patients with elevated serum iron markers have more active chronic hepatitis with more liver fibrosis.22 The serum ferritin value, an independent predictor of severe hepatic fibrosis in patients with chronic hepatitis C virus infection, predict hepatic iron and severity of disease. 23, 24 Clinical data indicate significant differences between men and women regarding liver injury in patients with alcoholic liver disease, chronic hepatitis C or nonalcoholic steatohepatitis. The penetrance of genetic hemochromatosis also varies between men and women, associated with gender-related differences in iron metabolism and chronic liver diseases. 25, 26 Vitamin D concentrations were associated with significantly lower risk of chronic liver disease. Results suggest a possible protective role for vitamin D in liver diseases.27 Osteoporosis is a common skeletal complication seen in patients with chronic liver disease. Various factors linked to the pathogenesis of bone loss are vitamin D, calcium, insulin growth factor-1, receptor activation of nuclear factor-κB ligand, bilirubin, fibronectin, leptin, proinflammatory cytokines, and genetic polymorphisms.28, 29 Osteoporosis is a common complication of chronic liver disease, especially in the final stages. The main mechanism involved in the development of osteoporosis in liver disease is deficient bone formation due to the harmful effects of substances such as bilirubin and bile acids or the toxic effect of alcohol on osteoblasts. To prevent and treat osteoporosis, good nutrition and calcium and vitamin D supplementation are required. 30 Liver diseases are often associated with increased bilirubin levels. *In vitro* data have shown that bilirubin can inhibit osteoblast proliferation.31

CONCLUSION

In the present study in patients at the acute phase of the disease. Decreased iron may lead to abnormal synthesis of total protein on the other hand prolonged deficiency of iron lead to decrease concentration of total protein in blood. Total protein, bilirubin, SGOT, SGPT, calcium and iron is the strong predictor for the occurrence of both for liver disease and its severity and complication. A well accepted fact the increasing incidence of disease with advancing age a possible explanation for the association of age and disease is based on the implication of iron deficiency in the pathogenesis of several disorders. Long term follow up in a large number of patients would be necessary to confirm these results.

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