Section: Biochemistry

Original Research Article

STUDY ON ASSESSMENT OF RENAL FUNCTION IN CHRONIC LIVER DISEASE

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Abstract

Background: Chronic liver disease and cirrhosis are frequently complicated with renal dysfunction and this combination leads to significant morbidity and mortality. In clinical practice plasma creatinine level and endogenous creatinine clearance are commonly used as more convenient but less accurate method for glomerular filtration rate assessment. **Materials and Methods:** The present study was done as a descriptive, observational study with a cross-sectional design. The study was undertaken in Department of Biochemistry and Medicine, Patna Medical College, Patna, Bihar during Feb 2023 to Dec 2023. It included the patients admitted with chronic liver disease of different aetiologies. **Result:** In this study most of the patients were in their forties and the mean age was 45.38 years and majority of patients were male. The study revealed most common cause of chronic liver disease was alcohol followed by Hepatitis B and Hepatitis C. All the patients had ascites and anaemia. **Conclusion:** The present study has found significant association between severity of liver dysfunction and some parameters of renal dysfunction. However no such significant association was found between distribution of different renal parameters among different aetiologies of chronic liver disease.

INTRODUCTION

Chronic liver disease is common clinical problem in our country. Chronic liver disease involves a process of progressive destruction and regeneration of liver parenchyma leading to fibrosis and cirrhosis.[1] Acute kidney injury, chronic kidney disease and the evaluation of numerous exogenous and endogenous measures of kidney function continue to be the focus of much research different patient population.[2] The presence of renal impairment in both groups is a poor prognostic indicator. Hepato-renal syndrome is a unique form of renal failure associated with advanced liver disease or cirrhosis and is characterized by functional renal impairment without significant changes in renal histology.[3]

Chronic liver disease and cirrhosis are frequently complicated with renal dysfunction and this combination leads to significant morbidity and mortality.[4] There is considerable evidence that renal failure in patient with cirrhosis primarily related to disturbances in circulatory function-mainly, a reduction in system vascular resistance due to primary arterial vasodilatation in the splanchnic circulation, triggered by portal hypertension.[5] Intrinsic renal diseases may occur in patient with hepatitis B or hepatitis C and alcoholic cirrhosis. Moreover, patients with cirrhosis may develop a specific acute renal failure called type-I hepatorenal syndrome. Independent of event that leads to acute renal failure, patient with cirrhosis may have diseases, such as diabetes mellitus or hypertension and atherosclerosis, which may cause chronic renal injury.[6,7]

In clinical practice plasma creatinine level and endogenous creatinine clearance are commonly used as more convenient but less accurate method for glomerular filtration rate assessment.[8]

Objectives

The study was undertaken to assess the renal function in chronic liver diseases and find out the association of alteration of renal function with gradation of liver disease.

MATERIALS AND METHODS

The present study was done as a descriptive, observational study with a cross-sectional design. The study was undertaken in Department of Biochemistry and Medicine, Patna Medical College, Patna, Bihar during Feb 2023 to Dec 2023. It included the patients admitted with chronic liver disease of different aetiologies.

Patients included in the study group were diagnosed of chronic liver disease and had a definite aetiology for the chronic liver disease such as: Viral (Hepatitis

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B, Hepatitis C), Alcoholic chronic liver disease, Non-alcoholic steatohepatitis, and Autoimmune (Wilson's disease, cryptogenic).

Unconscious patients, known patients of kidney disease and patients taking any nephrotoxic drugs and patients of chronic diseases such as tuberculosis, malignancy, diabetes mellitus was excluded from the study.

During the study period 65 patients were admitted with chronic liver disease but among them 5 were not included in the study as they had existing kidney disease or had a positive history of consuming nephrotoxic drug or had other chronic diseases like tuberculosis, malignancy or diabetes mellitus. Therefore, the number of study population was 60. The consent form was also approved by the institutional ethics committee.

Patients were interviewed about duration of the disease, presence of alcoholism, presence of yellowish discoloration of urine, vomiting of blood and passage of black stool. General survey was done to assess presence of anemia, jaundice, clubbing and oedema. The patients were also examined for presence of ascitis, hepato-splenomegaly, distented veins, everted umbilicus, spider naevi, palmar erythema, gynaecomastia, testicular atrophy, and bleeding manifestation to assess the severity of liver dysfunction.

Biochemical examination-like blood for hemoglobin, total count, differential count, ESR, and fasting and post prandial sugar was done. Laboratory investigations like total bilirubin with conjugated and un-conjugated fraction, Alanine amino transferase, Aspartate amino transferase S, Alkaline Phosphatase, total protein, albumin, globulin, prothrombin time, HBSAg, Anti-nuclear antibody, Anti-Liver Kidney Microsomal antibodies 1, 2 & 3 were done. Ascitic fluid was examined to assess the aetiology and severity of chronic liver disease. For assessment of kidney function serum urea, creatinine, seum sodium and potassium were examined.

Radiographic examination like ultrasonography of upper abdomen and Kidney, Ureter, Bladder was done. Upper gastrointestinal endoscopy was done for detecting gastro-oesophagial varices, Routine and microscopic examination of urine, 24 h protein excretion and measurement of 24 h urine volume was also done.

Statistical Analysis

Data was collected and tabulated and analysis was done by using standard statistical software like SPSS version 20 with proportion and percentage and statistical test like Mann Whitney and Kruskal Wallis.

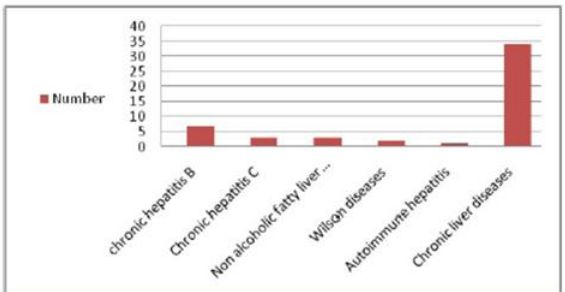
RESULTS

In this study most of the patients were in their forties and the mean age was 45.38 years and majority of patients were male. The study revealed most common cause of chronic liver disease was alcohol followed by Hepatitis B and Hepatitis C. All the patients had ascites and anaemia.

[Figure 1] reveals, among study population, 44 (69%) patients suffered from Alcoholic liver disease,8 (15%) patients had chronic Hepatitis-B, 4 (7%) patients had chronic Hepatitis-C, 2 (4%) patients had Nonalcoholic fatty liver disease, 1 (2%) patients had Wilson's Disease and 1 (1%) patients had autoimmune hepatitis. 49 patients (79%) had Serum total protein 7 gm/dl. fifty-seven patients (95%) had Serum albumin level <4gmdl. fifty-one patients (83%) had serum urea within the range of 17-45 mg/dl. seven patients (16%) had serum urea > 45 mg/dl. Fifty patients (90%) on day 1 had serum creatinine level 1.5 mg/dl, and 50 patients (90%) had serum creatinine level on day 3 as1.5 mgdl.

Seventy six patients had serum bilirubin level > 2.5mg/ 30 patients (40%) had Serum Aspartate amino transferase (AST) within the range of 45-100 u/L. forty five patients(75%) had Serum Alanine amino transferase (ALT) < 100 u/L 25 patients(30%) had Serum Alkaline phosphatase (ALP) < 100 u/L. forty three patients (66%) had Serum ALP within the range of 100-200 u/L. four patients(4%) had Serum ALP > 200 u/L. Fifty seven (94%) patients had dilated portal vein. Thirty three (46%) patients had grade-II esophageal varices, 34 (48%) had grade-III esophageal varices detected by Upper GI endoscopy.

It was found in the study that distribution of serum urea and creatinine, according to the severities of liver disease as per Child Pugh classification, was statistically significant, but serum creatinine level on day 1 and day 3 was not found to be significantly distributed among different aetiologies of chronic liver disease as tested by Kruskal Wallis test.



[Table/Fig-1]: Distribution of study population according to different aetiologies

Table 1: Renal function profile in chronic liver disease

Parameter	Frequency (%)
Serum Urea (mg / dl)	
15-40	40(80%)
>41	10(18%)
Creatinine (mg / dl)on day 1	
1	48(80%)

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2	12(20%)
Creatinine (mg / dl) on day3	
1	48(80%)
2	5(8%)
3	5(8%)
4	3(4%)
Serum albumin(gm/dl)	
<3	56(94%)
3-3.5	3(4%)
>3.5	2(2%)
Serum globulin(gm/dl)	
<2.5	2(2%)
>2.5-4	49(82%)
>4	9(16%)
Renal biopsy	
Mesangial proliferation,Ig A deposition	8(14%)
Normal	51(86%)

Table 2: Liver function profile in chronic liver disease

Liver function profile	Numbers (%)
Total bilirubin	
<2	20(34%)
2-3	30(50%)
>3	9(16%)
Serum ALT(U/L)	
42-100	24(40%)
101-200	32(54%)
>200	3(6%)
Serum AST(U/L)	
<100	42(70%)
100-200	14(24%)
>200	3(6%)
Serum ALP(U/L)	
<100	18(30%)
100-200	39(66%)
>200	2(4%)
Portal vein diameter	
12	3(6%)
13	18(30%)
14	33(56%)
15	4(8%)
Upper GI endoscopy- esophageal varices	
Abs	3(6%)
G-II	27(46%)
G-III	28(48%)

DISCUSSION

The present study found maximum number of patients with the mean age 45.38 y. This finding was similar to Fleming KM et al,[9] who also found an increased incidence of chronic liver disease with increase in age. This study showed that the majority of patients were male which is similar to Fleming KM et al.[9] The study also found that the incidence was over 50% higher in men compared with women. Alcohol, Hepatitis B, Hepatitis C and non alcoholic fatty liver disease (NAFLD) were among the causes of cirrhosis. Present study showed most common cause was alcohol followed by Hepatitis B and Hepatitis C.

Fasalato Silvano et al,[10] found ascites in 233 patients (75.4%). In this current study all patients had ascites. In the present study anaemia complicated most cases of cirrhosis; all patients had anaemia and most had moderate anaemia. In a study done by McHutchison JG et al,[11] it was found that bilirubin level was 3-10 mg/dl in cirrhosis unless other factors like hemolysis, acute viral hepatitis, were present in this study most patients had bilirubin in the range of 3-10 mg/dl.

Liver enzymes e.g. AST and ALT increase modestly in cirrhosis and usually in the range of 300 u/l.[12] In current study there was modest elevation in both enzymes. ALP level usually remains normal in cirrhosis.[13] In our study mean ALP level was 117u/l which is normal. Albumin level was reduced with altered albumin: globulin ratio which is a usual laboratory finding in chronic liver disease.[13]

In one study, 40% patients with compensated cirrhosis and 80% patients of uncompensated cirrhosis had varices.[14,15]

Current study too majority of the patients (95%) had varices. In a study from Dhaka,[16] no statistically significant relation between Child-Pugh score and serum creatinine was found but in our study, change of creatinine with Child-Pugh score was statistically significant ($p<0.001$). Fornari F et al,[17] showed 30% of patients with cirrhosis had gall stones, risk of developing stones most strongly associated with Child's grade C & alcoholic cirrhosis with a yearly

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incidence of about 5%.In our study cholelithiasis in CLD was incidental USG finding. Majority (8%) occurred in ALD and 4% in HEP-C.

In the present study there was no statistically significant change in renal parameters in different aetiologies of liver disease but the result was different in other studies,[15-17] like prevalence rate of AKI in cirrhosis was 68% in a study conducted by Fernandez-Seara J,[17] but in our study only 15% patients had AKI. In the same study prevalence of hepatorenal syndrome was 25%.[15] Another study showed that among patients with ascites, HRS developed in about 20% and 40% of the patients, at 1 and 5 years, respectively.[17] Ruiz-del-Arbol L et al,[12] in a study done on 23 cirrhotic patients with spontaneous Bacterial peritonitis of which 8 patients developed type-I Hepatorenal syndrome.

CONCLUSION

The present study has found significant association between severity of liver dysfunction and some parameters of renal dysfunction. However no such significant association was found between distribution of different renal parameters among different aetiologies of chronic liver disease.

This study emphasizes the fact that we should be more vigilant when treating CLD patients, regarding their renal function, as proper screening, prevention and treatment of renal dysfunction can decrease morbidity and mortality.

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