Original Article

Relationship of Child-Pugh Classification with Liver Function Tests and its Clinical Implication in Patients of Chronic Liver Disease

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ABSTRACT

Background: Child-Pugh classification currently remains the most important parameter to determine liver function in patients of chronic liver disease (CLD). This study was carried out to find a relationship between abnormal Liver Function Tests (LFTs) and extent of liver damage in patients of CLD grouped as Child class A and B.

Aims and objectives: To find a relationship between LFTs and severity of liver disease assessed by Child-Pugh scoring.

Study Design: Retrospective study.

Place and Duration of Study: This study was conducted at the Medical Words of Services Hospital, Lahore from February 2009 to June 2009.

Materials and Methods: It was a retrospective analysis of 40 patients aged 17-74 with CLD. Patients were selected from medical wards of Services Hospital Lahore. Patients were classified as Child class A and B on the basis of severity of liver function. Liver function tests including prothrombin time(PT), serum bilirubin, enzymes like Alkaline Phosphatase (ALP), Aspartate Transaminase (AST), Alanine Transaminase (ALT), serum Proteins and Albumin concentrations were performed by standard laboratory methods.

Results: It was observed that serum level of ALP, ALT, AST and the AST/ ALT ratio as well as prothrombin time were significantly increased in patients as compared to their controls. On the other hand level of total proteins and albumin were significantly decreased in patients as compared to their controls whereas the level of bilirubin remains insignificant.

In Child class B patients the levels of serum bilirubin, ALP, ALT, AST and ratio AST/ALT were increased as compared to these parameters in Child class A patients. It was observed that level of serum ALP and ALT were non significantly and level of serum bilirubin, AST and AST/ALT ratio were significantly increased in Child class B patients as compared to the patients of Child class A. On the other hand level of serum total proteins and albumin were significantly decreased in Child class B patients as compared to patients of Child class A. Prothromin time is significantly increased in Child class B patients as compared to the patients of Child class A.

Conclusion: Further deterioration in LFTs may warn a clinician about progress of disease in a patient of CLD and to further investigate about the liver function at that stage.

Key Words: Liver function test, Child Pugh classification, chronic liver disease (CLD).

INTRODUCTION

Interpreting abnormal liver function tests (LFTs) and trying to diagnose any underlying liver disease is a common scenario in Primary Care. These tests can also be used to distinguish among different types of liver disorders, guage the extent of known liver damage, and follow the response to treatment[1].

Most common liver function tests like serm bilirubim, albumin, and prothrombin time can indicate liver damage. Prothrombin time may help to measure the liver's ability to synthesize platelets. Prothrombin ime may be elevated in hepatitis and cirrhosis[2]. Elevated aspartate aminotransferase and alanine aminotransferase level associated with hype bilirubinemia in cirrhosis are observed[3]. Ratio of AST/ALT is biomarkers of liver injury in a patient with some degree of intact liver function[4]. The AST/ALT ratio is a dependable marker of stage of fibrosis and cirrhosis[5]. In chronic liver disease AST>ALT once cirrhosis established. The extremes of AST/ALT ratio are also helpful; ratio more than 2 suggests alcoholic liver disease, and a ratio of <1 suggests nonalcoholic disease[6'7].

Srum bilirubin convertration was independently correlated with bleeding time, suggesting that liver function has an important role in determining primary haemostasis in patients with cirrhosis[8].Serum bilirubin, albumin, and prothrombim time are altered only in patients with advanced liver disease[9]. Albumin concentration is diminished in patients with liver failure and this may be due in part to its detoxifying capabilities[10].

Among the evaluation approaches of liver function, including aminotransferases, bilirubin, albumin, prothrombin time, currently Child-Pugh classification remains the most important method to determine the prognosis of liver function, especially in patients of

chronic liver disease. However, all these approaches have their limitations[11].

MATERIALS AND METHODS

Statistical analysis: Data was analyzed by using SPSS-18.0. Quantitative variables like prothrombin time, serum bilirubin, enzymes like alkaline phsophatase, aspartate transaminase, alanine transaminase, serum protein and albumin were reported as mean ± S.D. Variables were calculated compared with controls using student 't' test. P values of < 0.05 was considered statistically significant.

RESULTS

Levels of serum bilirubin, ALP, ALT, AST and their ratio were increased in patients as compared to these of controls. It was observed that level of serum bilirubin was not significantly increased. On the other hand level of ALP, ALT, AST and their AST/ALT ratio were significantly (P<0.001) increased as compared to their controls. Level of total protein and albumin were significantly decreased (P<P0.001) in patients as compared to controls. Prothromin time is increased non significantly in patients as compared to that of controls (Table 1). Levels of serum bilirubin, ALP, AST and AST/ALT ratio were increased in patients of Child class B patients as compared to these parameters of Child class A patients. It was observed that level of serum ALP and ALT were non significantly affected. On the other hand level of serum bilirubin, AST and AST/ALT were significantly (P<0.001) increased in Child class B patients a compared to the patients of Child class A. Level of serum total protein and albumin were significantly decreased (P<0.001) in Child class B patients as compared to patients belong to Child class A. Prothromin time is significantly increased (P<0.001) in Child class B patients as compared to the patients of child class A (Table 2).

Table No.1: liver function test in Child class A and class B groups

Lever Function test	Total Cases	Controls(20)
Serum Bilirubin (mg/dl)	2.13±1.76**	0.46±0.29
ALP (U/L)	266.8±96.46**	95.5±20.93
AST (U/L)	59.4±23.92**	25.3±3.08
ALT (U/L)	43.0±12.95**	27.0±8.24
AST/ALT ratio	1.40±0.47**	0.97±0.15
Total Protein (gm/dl)	6.30±0.55*	7.4±0.43
Albumin (gm/dl)	3.3±0.56**	4.2±0.26
PT (seconds)	14.0±2.34	13.1±4.01

**P^0.001= Highly significant difference.

Table No.2: Liver function test in Child Class A and Class B Groups

Liver Function test	Child Class A (13/32.5%)	Child Class B (27.67.5%)	Controls (20)
Serum bilirubin (mg/dl)	0.92±0.34	2.7±1.9**	0.46±0.29
ALP(U/L)	232.2±94.26	283.4±94.72	95.5±20.39
AST(U/L)	43.2±9.15	67.2±24.98**	25.3±3.08
ALT U/L)	38.8±8.2	45.0±14.4	27.0±8.24
AST/ALT Ratio	1.15±0.32	1.52±0.49**	0.97±0.15
Total Protein (gm/dl)	6.6±0.27	6.1±0.58**	7.4±0.43
Albumin (gm/dl)	3.6±0.36	3.2±0.60**	4.2±0.26
PT(seconds)	12.2±0.44	14.82±2.42**	13.1±4.01

**P<0.001= Highly significant difference.

DISCUSSION

Long standing liver diseases like hepatitis, continued toxic insults of liver like alcohol or chronic drug use, damage from free radicals etc. result in formation of scar tissue or cirrhosis. This results in compromised liver function[12].

Levels of serum bilirubin and ALP were increased in patients as compared to controls in our study . This was in contrast with a study who found that marked elevation of Alkaline Phosphatase is observed only in biliary cirrhosis[13]. Other study found that increased level of serum bilirubin and Alkaline Phosphatase indicate some type of liver dysfunction resulting in liver tissue damage. However level of serum bilirubin and ALP are predictors of poor prognosis[14]. Another study found that severity of liver disease is assessed by bilirubin concentration[15].

Present study is in accord with a study who observed an elevated level of AST, ALT and their ratio in patients of CLD. Study reported that ALT and AST both use pyridoxine as a coenzyme, but the synthesis of ALT is more strongly inhibited by pyridoxine deficiency than is the synthesis of AST[16]. Present study observed that the level of AST>ALT. a group of workers reported that although ratio of AST:ALT> or = 1 is highly specific but not diagnostic for the presence of cirrhosis[17,18]. The ratio reflects the grade of fibrosis in these patients. Our results are in contrast to the study who observed that once cirrhosis is established, ALT>AST.

Present study observed significant increased ratio AST/ALT i.e. 1.25 in patients with cirrhosis as compared to their controls. It is reported that a ratio of AST/ALT>1 suggested cirrhosis. This ratio is used to distinguish cirrhotic patients with chronic HCV infection from noncirrhotic patients and also used to

correlate the ratio with the grade and stage of hepatitis and other biochemical indices[18,19].

Level of total protein and albumin were significantly decreased (P>0.001) in patients as compared to their controls. A study suggested marked dysfunction of albumin function in advanced cirrhosis[20]. Our study observed a non significant increased level of Prothromin time in patients as compared to their controls. Longer prothrombin time was also observed in a study which may indicate some type of liver dysfunction resulting in liver tissue damage[15].

In the present study 32.5% patients fell into the Child class A, 67.5% in class B. A study reported that once patients with any type of liver disease fall into the Child-Pugh class B or class C category, survival is significantly reduced and transplantation should be considered[21].

It was observed that level of serum ALP and ALT were non significantly increased in child class B patients as compared to Child class A patients. On the other hand, level of AST and AST/ALT were significantly (P<0.001) inreased in child class B patients as compared to patients of child class A. A study reported that the markers of hepatocyte injury and inflammation are AST and ALT[22]. However a study reported that markers of hepatocellular injury, AST and ALT lack some specificity because they are found in skeletal muscles too[23]. Another study stated that the ratio of AST/ALT provides prognostic information independent of Child-Pugh class in cirrhosis[24].

Level of serum bilirubin, serum total protein and albumin were significantly decreased (P<0.001) in Child class B Patietns as compared to patients of Child class A. It is reported that hepatic function can be assessed by applying the values for albumin, bilirubin and prothrombin time in the modified Child-Pugh grading system. Serum albumin level can serve as an index of liver synthetic capacity. Low albumin is most often caused by acute or chronic liver disease[25]. The prothrombin time (PT) does not become abnormal until more than 80 percent of liver synthetic capacity is lost. This makes PT a relatively insensitive marker of liver dysfunction[26].

CONCLUSION

Progress of deterioration in level of different parameters of standard Liver Function Tests in a patient of chronic liver disease may alert clinician to the progress of liver damage. They can be considered by the clinician to evaluate the liver function again to determine status of liver function at that stage.

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