

Observation of Biochemical Changes Associated with Hepatitis B Virus Infection

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Abstract

Introduction: Hepatitis B is a viral disease with a high incidence and prevalence worldwide and it can cause acute and chronic liver disease.

Aim: The present study was conducted to evaluate the some biochemical changes in patients with hepatitis B viral infection in Bharatpur district, Rajasthan.

Material and Methods: Ninety patients with chronic hepatitis B viral infection and thirty apparently healthy subjects were enrolled in this study. Blood samples of patients were tested to determine aminotransferase (AST), alanine aminotransferase (ALT), serum alkaline phosphatase (AP), total serum bilirubin (TSB) and fasting blood sugar (FBS).

Results and Conclusion: The mean value of AST and ALT for patients was higher than of controls. No significant differences were seen between patients and controls for AP and TSB. The FBS for patients was more than of controls.

Keywords: HBV, AST, ALT, AP, TSB, Liver

Introduction

Hepatitis B is a viral disease caused by Hepatitis B virus with a high incidence and prevalence worldwide and it can cause acute and chronic liver disease. ⁽¹⁾ Approximately (8%) of the world's population has been infected with

HBV, and about (350 million, 5–6%) are persistent carriers of HBV. ⁽²⁾ The clinical presentation ranges from subclinical to symptomatic and, in rare instances, fulminant hepatitis. ⁽³⁾ Perinatal or childhood infection is associated with few or no symptoms, but it has a high risk of becoming chronic. There are limited number of medications that can be used to effectively treat chronic hepatitis B; a safe and effective vaccine is available to prevent hepatitis B infection. ⁽⁴⁾

Chronic HBV is associated with many anatomical, epidemiological, physiological, biochemical and immunological changes. Due to the fact that inadequate information regarding the effect of these factors on patients are available, this study was carried out to provide insight to this question and to know some physiological changes in patients. Also this study will aid in gaining a better understanding of the pathogenesis of the chronic HBV, and this ultimately leads to advances in the design of drugs of choice to prevent and treat this disorder. To fulfill these objectives, the present study has dealt with samples of patients to determine AST, ALT, AP, TSB and FBS.

Materials

Subjects of the study

Ninety patients were included in this study consisted of (68 males) and (22 females). The mean age of those patients was (31.5 ± 7.8) years). The epidemiological distribution of those patients was as the following: The residency (65 urban and 25 rural area), marital status (62 married and 27 single), economic status (19 good, 24 medium and 47 low level), educational level (19 high education levels and 71 low educational levels), history of smoking (64 with positive history and 26 with negative history), alcohol intake (80 not alcoholic while 10 alcoholic) and all patients included in this study have no history of drugs addiction. Thirty apparently healthy subjects (clinically assessed by specialist doctors) were included as controls in this study, which consist of (21 males) and (9 females). The mean age of those subjects was (30.5 ± 6.7) years). Those subjects were selected randomly from the population.

The epidemiological distribution of those subjects was as the following: The residency (23 urban and 7 rural area), marital status (19 married and 11 single), economic status (4 good, 9 medium and 17 low level), educational level (4 high education, 26 low education), history of smoking (21 with positive history and 9 with negative history), alcohol intake (26 not alcoholic while 4 alcoholic) and all subjects enrolled in this study have no history of drugs addiction.

Methodology

Blood samples were collected in two tubes the first tubes contain disodium ethylene diamine tetra acetic acid (EDTA) as anticoagulants to be used for hematological studies. The second tubes were without anti-coagulant as plain tubes, for blood to be used for preparing sera for subsequent biochemical tests.

The investigations for those patients and control group were done as per manufacturer's instructions in the

laboratory of RBM Hospital, Government Medical College, Bharatpur, Rajasthan.

Statistical analysis

All values were expressed as means \pm SD. The data were analyzed by using of SPSS program and taking $p < 0.05$ as the lowest limit of significance. Student's t-test was used to examine the differences between different groups. Both t-test, chi square and ANOVA test were applied to determine the differences between one group and another, and between all groups and within group.⁽⁵⁾

Results

The mean values of AST for patients enrolled in this study was (46.11 ± 8.21) IU/L, whereas in control group it was (20.47 ± 5.30) IU/L). There were a significant ($P < 0.05$) difference between patients and control group. The mean values of ALT for patients was (48.22 ± 8.04) IU/L), compared to (15.57 ± 4.42) IU/L) in control group. Significant differences ($P < 0.05$) between patients and control group were found.

There were insignificant differences ($P > 0.05$) between patients and control group, and the mean values of AP for patients was (52.44 ± 13.05) IU/L), and for control group it was (49.34 ± 9.88) IU/L). This study revealed that there was in significant ($P > 0.05$) statistical differences in the mean values of TSB for patients (11.81 ± 3.87) μ mol/L), and control group (11.43 ± 3.88) μ mol/L). This study revealed that there was a significant difference ($P < 0.05$) between the mean values of FBS for patients (8.15 ± 1.85) mmol/L), and control group, (4.34 ± 0.65) mmol/L). (Table 1)

Table 1: Mean values of investigations for patients and control group

Investigations	Patients (Mean ± SD)	Controls (Mean ± SD)	P-value
AST	46.11 ± 8.21 IU/L	20.47 ± 5.30 IU/L	<0.05
ALT	48.22 ± 8.04 IU/L	15.57 ± 4.42 IU/L	<0.05
AP	52.44 ± 13.05 IU/L	49.34 ± 9.88 IU/L	>0.05
TSB	11.81 ± 3.87 µmol/L	11.43 ± 3.88 µmol/L	>0.05
FBS	8.15 ± 1.85 mmol/L	4.34 ± 0.65 mmol/L	<0.05

Discussion and Conclusion

The present study showed that, the aminotransferase enzymes will mildly elevate in chronic HBV infection and this finding is consisted with other study. ⁽⁶⁻⁹⁾ Aminotransferases are normally intracellular enzymes (mainly hepatic cells), and low levels found in the plasma represent the release of cellular contents during normal cells turnover, so elevation of plasma aminotransferases level indicates damage to cells rich in these enzymes, such as viral hepatitis. ⁽¹⁰⁾

The present study revealed that no significant differences in AP between patients and control group. In other words the elevation of AP in chronic HBV is unusual. This finding is in agreement with ⁽¹¹⁾; that showed elevation of AP above reference limit in less than 10% of examined cases and about 90% of those patients are of normal values. Another study done for uncomplicated hepatitis revealed that the elevation of AP above normal limit is present in less than 8% of examined cases. ⁽¹²⁾ The mild elevation of serum AP in chronic HBV infection showed no significant statistical difference. ⁽¹³⁻¹⁴⁾

This study revealed that there were no significant statistical differences in mean values of TSB for patients and control group, and this finding is consistent with ⁽¹⁵⁾, who mentioned that, the serum bilirubin level is normal in chronic viral hepatitis. These findings indicate that the TSB didn't increase in chronic HBV infection which is

different from an acute hepatitis B infection when the jaundice develops in 33-50% of cases. ⁽¹⁶⁾ The bilirubin is metabolized in the liver and secreted via biliary ducts, so any defect in hepatocytes lead to increase in TSB, but in chronic HBV infection it is mildly elevated. ⁽¹⁴⁾ that is why no statistical difference between patients and controls was noticed.

This study revealed that there is a significant difference between the mean values of FBS for patients and control group. ⁽¹⁷⁾ The present study was similar in it is finding to another study ⁽¹⁸⁾ who found that the impaired glucose tolerance and overt DM frequently occurs in patients with chronic liver disease, and among the cirrhotic patients 57.1% had HBV related disease, and a DM was observed in 22.4% of the cirrhotic patients; and only 20.6% of the diabetic patients had normal range of blood glucose levels even though most of them received medical therapy. The explanation of these results as mentioned by Kwon et al in their study, ⁽¹⁸⁾ that hyperinsulinaemia and peripheral insulin resistance contribute to the development of DM in these patients. Patients with HBV infection showed signs of enhanced insulin resistance but overt diabetes develops in those who, in addition to insulin insensitivity, have a relative defect of insulin secretion which is the main mechanism leading to both glucose intolerance and overt diabetes. ⁽¹⁹⁾

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