

Evaluation of Liver Function and Coagulation Profiles in Patients with Hepatitis B and C in Peshawar

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ABSTRACT

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Background: Chronic liver disease is largely caused by Hepatitis B and C which is extremely rampant in Pakistan. Liver and coagulation profile assessment of Peshawar patients is relevant to detect the severity of the disease at an earlier stage and manage the disease better. The of study was to compare hepatitis B and hepatitis C patients with the aim of evaluating the difference in hepatic injury and liver functioning through the comparison of liver enzyme levels and coagulation parameters.

Material and Method: This case-control study was conducted at Al-Khidmat Hospital and Abasyn University Peshawar to assess liver and coagulation profiles in 100 participants, including 50 confirmed hepatitis B or C patients and 50 healthy controls.

Result: Among the 50 patients, 56% were HBV-positive and 44% HCV-positive, with a male predominance (58%). Abnormal elevations in ALT, ALP, and bilirubin were observed in a majority of infected individuals. Specifically, 60.7% of HBV-infected males and 50% of HCV-infected males exhibited elevated ALT levels, indicating liver inflammation. Also HBV and HCV had significantly increased levels of bilirubin and ALP and this indicated that there was hepatocellular injury and possible cholestasis or bone involvement. There was also presence of prolonged PT and APTT values in both male and female patients which showed evidence of liver synthetic impairment and high chances of bleeding. An example is the fact that 50% of HCV-positive males and 66% of HBV-positive males had high values of PT and that the same happened with APTT in the two groups.

Conclusion: The results emphasize the necessity to conduct regular screening through biochemical and hematological methods, particularly among the high-risk groups to avert the development of cirrhosis or Hepatocellular Carcinoma due to Hepatitis B and Hepatitis C.

Keywords: Hepatitis B, Chronic Liver Disease, Liver Function Tests (LFTs), Coagulation Profile.

INTRODUCTION

Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) infection are significant health issues in most countries of the world and particularly in developing nations such as Pakistan. These infections can lead to chronic liver diseases, cirrhosis, and hepatocellular carcinoma if not diagnosed and managed early.¹ Liver enzymes such as alanine aminotransferase (ALT), aspartate aminotransferase (AST), and bilirubin levels are critical biochemical markers to assess liver function. Similarly, coagulation profiles (e.g., prothrombin time, international normalized ratio) reflect the synthetic capability of the liver, helping in evaluating the extent of liver damage.² Presence of inflammatory cells in liver is called Hepatitis which may lead to the liver Cirrhosis or Hepatocellular Carcinoma. Mostly etiology of Hepatitis is viruses particularly Hepatitis B and C virus.³

Both viruses are challenging to identify in the initial phases of infection because they have lengthy incubation periods and no distinct signs or symptoms until they become chronic.^{4,5} Because hepatocytes have unique molecules on their surface that function as viral receptors, hepatitis viruses can only enter hepatocytes. These viruses have the ability to increase blood levels of the liver-damaging enzymes aspartate aminotransferase (AST) and an enzyme called a (ALT). Since skeletal and cardiac muscle also excretes these aminotransferases, particularly serum AST levels, these enzymes are not invariably linked to liver impairment.⁶ According to the World Health Organization Global Hepatitis Report 2024, viral hepatitis remains a major global public health concern. In 2022, an estimated 254 million people were living with chronic Hepatitis B infection and about 50 million people were living with chronic Hepatitis C infection worldwide.⁷ These

infections collectively cause approximately 1.3 million deaths primarily because of liver cirrhosis and hepatocellular carcinoma, yearly. Viral hepatitis has remained a rising health burden across the world even in the wake of the strides that have been made in disease prevention and treatment. Other countries like Pakistan are still severely affected with millions of people infected and thousands of new cases being reported annually, making hepatitis one of the major challenges that face the population health in the region.^{8,9}

In Pakistan, HBV affects more males than women, although HCV is prevalent in both sexes. Viral hepatitis can cause major maternal health problems or even foetal mortality in pregnant women.¹⁰ Compared to HCV, the hepatitis B virus is more vertically spread. While HCV transmission depends on a pregnant woman's viral load, Hepatitis B can spread vertically if the mother is a chronic carrier or acquires it in the latter stages of pregnancy.¹¹

Liver enzymes ALT and AST, bilirubin level, coagulation profile especially the INR and prothrombin time are important indicators of liver health in clinical assessment of Hepatitis B and C, and the synthetic functionality of the liver is measured by coagulation profiles.¹² The level of bilirubin might be a measure of bile duct obstruction or liver dysfunction. Prolonged INR and prothrombin time indicate liver dysfunction and may expose one to bleeding.¹³ Because hepatitis B immunoglobulin and vaccinations are insufficient to reduce the risk of vertical infection, additional antiviral medications may also be provided for the treatment of hepatitis B in pregnancy.¹⁴ Hepatitis C treatment exhibits a difference in the pregnant women when compared to normal patients. The HBV and HCV infection in Peshawar is high and the localized data on correlation of liver enzymes and coagulation profiles with degree of disease is also limited.¹⁵

To compare the liver enzyme and coagulation factor of hepatitis B and hepatitis C patients. The current paper aims to examine disease-specific alterations, which suggest the presence of hepatic damage and synthetic hepatic liver functioning. The findings might be utilized to contribute to the initial diagnosis, disease monitoring, and improved clinical management.

MATERIALS AND METHODS

The study was a case-control study that was carried out at the Al-Khidmat Hospital, Peshawar and as well as Medical Laboratory Skill Lab, Abasyn University,

Table 1: Gender-wise and Disease-wise Distribution of Hepatitis B and Hepatitis C Patients

Disease Type	Total Patients	Male, % (n)	Female, % (n)
Hepatitis B	28	60.7% (17)	39.3% (11)
Hepatitis C	22	54.5% (12)	45.5% (10)
Overall	50	58.0% (29)	42.0% (21)

The reference ranges employed were: ALT <40 U/L, ALP 40120 U/L, Total bilirubin 0.2-1.2 mg/dL, PT 1113.5 seconds and APTT 2535 seconds. Table (2) shows the liver functioning and coagulation parameters

Peshawar. A total 50 patients with chronic hepatitis B or hepatitis C and 50 control healthy were recruited in the study.¹⁶ Healthy controls were screened through liver function tests and medical history review to ensure the absence of underlying liver disease. The study was conducted with ethical approval of the pertinent institutional review committee before the study began. The informed consent of all participants was received in writing prior to the start of the study and confidentiality of patient information was highly observed during research period.

The study included the patients aged 18 years and above with known seropositivity to the hepatitis B surface antigen or hepatitis C antibodies but were not on antiviral therapy at the time of entry into the study. To exclude confounding factors on liver and coagulation parameters, patients who had known hepatitis other than viral hepatitis e.g. autoimmune hepatitis, alcoholic liver disease and others who took hepatotoxic drugs and those under anticoagulant treatment were excluded.

Aseptic venous blood samples were taken off the antecubital vein of the participants. Alanine aminotransferase, alkaline phosphatase, total and direct bilirubin parameters were examined using an automated clinical chemistry analyzer according to the usual laboratory procedures. Coagulation parameters such as the prothrombin time, activated partial thromboplastin time and international normalized ratio were also measured on a coagulation analyzer. Analysis of the data collected was done using Statistical Package of the Social Sciences (SPSS) version 25 to compare liver and coagulation profiles between patients of hepatitis B and hepatitis C and give an insight into hepatic injury and coagulation condition in chronic patients of hepatitis B and C.¹⁷

RESULT

This cross-sectional study comprises of total of 50 participants confirmed Hepatitis B and Hepatitis C positive samples. Out of the total 50 patients included in the study, 58% (n=29) were male, while 42% (n=21) were female. This indicates a higher proportion of male patients compared to female patients in the study population. 56% (n=28) were diagnosed with hepatitis B, while 44% (n=22) had hepatitis C. Among patients with hepatitis B, 60.7% (n=17) were male and 39.3% (n=11) were female. In the hepatitis C group, males accounted for 54.5% (n=12), while females constituted 45.5% (n=10) shown in the table (1).

comparison of HBV and HCV patients. The average ALT was 68.4 + 22.7 U/L in HBV and 82.1 + 25.3 U/L in HCV patients (p = 0.041), and the average total bilirubin was 2.1 + 0.9 mg/dl in HBV and 2.6 + 1.1

mg/dl in HCV patients ($p = 0.048$), which had statistically significant differences. Mean ALP (HBV: 134.6 ± 38.2 U/L, HCV: 149.8 ± 41.5 U/L, $p = 0.173$), PT (HBV: 15.2 ± 2.3 sec, HCV: 16.1 ± 2.7 sec, $p = 0.214$)

and APTT (HBV: 38.6 ± 5.5). These findings suggest that HBV and HCV infections are both linked to liver dysfunction and coagulation anomalies, and HCV has slightly more ALT and bilirubin levels.

Table 2: Comparisons of Liver profile of Hepatitis B patients

Parameter	Reference Range	HBV Patients (n=28) Mean \pm SD	HCV Patients (n=22) Mean \pm SD	p-value
ALT (U/L)	< 40	68.4 \pm 22.7	82.1 \pm 25.3	0.041
ALP (U/L)	40–120	134.6 \pm 38.2	149.8 \pm 41.5	0.173
Total Bilirubin (mg/dL)	0.2–1.2	2.1 \pm 0.9	2.6 \pm 1.1	0.048
PT (seconds)	11–13.5	15.2 \pm 2.3	16.1 \pm 2.7	0.214
APTT (seconds)	25–35	38.6 \pm 5.4	41.2 \pm 6.1	0.097

Fifty participants were assessed in terms of liver functioning and coagulation. The alanine aminotransferase (ALT) was found to be elevated in 25 males and 20 females whereas alkaline phosphatase (ALP) was found to be elevated in 27 males and 23 females. Higher bilirubin concentration was identified in 18 males and 14 females, and 18 of them represented normal bilirubin levels. In terms of coagulation parameters, a long prothrombin time (PT) was reported

in 25 male and 16 female, and 9 subjects reported normal prothrombin time (PT). Likewise, extended activated partial thromboplastin time (APTT) was also observed in 25 males and 23 females with 2 persons having a normal APTT value. In general, high liver enzymes and coagulation defects were more common in male subjects than in female ones indicating a greater proportion of biochemical changes in the males of the study population.

Table 3: Liver function and coagulation profile abnormalities among study participants (n = 50)

Parameter	Reference Value	Sample Size (n)	High Value in Male	High Value in Female	Normal Value
ALT	45 U/L	50	25	20	5
ALP	306 U/L	50	27	23	0
Bilirubin	1.0 mg/dl	50	18	14	18
PT	14 sec	50	25	16	9
APTT	32 sec	50	25	23	2

DISCUSSION

This cross-sectional study examined liver function and coagulation profiles in patients infected with Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) compared to a healthy control group. It used a total of 100 participants; 50 with confirmed case of HBV or HCV infection and 50 without any infection. The analysis was based on gender and the type of disease, which provides good understanding of the pathology of the disease and laboratory abnormalities that are usually observed in these infections.

The analysis showed that liver enzymes such as alanine aminotransferase (ALT), alkaline phosphatase (ALP) and bilirubin were significantly increased in both HBV and HCV individuals in line with the existing literature of hepatic inflammation and cellular damage. The percentage of normal ALT levels in the males infected with HCV was 50 and 40.9 and in the females infected with HCV was 60.71 and 39.28 respectively. The same tendencies were observed in research,^{6,18} where ALT levels have been greatly raised in HBV and HCV patients in comparison to healthy people, frequently related to the severity and progression to fibrosis or cirrhosis. The alkaline phosphatase levels were also high in a significant proportion of patients 12 Males and 10 females with HCV and 6 Males and 3 females with HBV. High ALP usually indicates cholestasis or bone related pathology, however, with viral hepatitis, it

indicates the blockage of the bile ducts or extensive destruction of the hepatocytes.¹⁹

According to a study, ALP is commonly high in terminal hepatitis especially in patients that develop cirrhosis.²⁰ Out of 36.36% HCV-positive males and 27.27% HCV-positive females, bilirubin was high and 9 HBV-infected males and 4 HBV-infected females had high bilirubin levels. Hyperbilirubinemia suggests a defect of hepatic secretion or severe hepatocellular injury. These results are in line with the studies of who found that the higher the bilirubin level the higher the extent of hepatic fibrosis in chronic viral hepatitis patients.²¹

Analysis of the coagulation profile showed that patients of HBV and HCV had prolonged prothrombin time (PT) and activated partial thromboplastin time (APTT) which indicated the poor production of clotting factors as a result of liver dysfunction. Prolonged PT values were present in 50% of males and 31.8% of females in patients who were infected with HCV. In HBV, the PT was increased in half of the male and 32.1 percent of the female patients. On the same note, 11 HCV-infected males and 10 females had an increased APTT and 16 males and 11 females had an increased APTT among the HBV patients. Such results indicate that there is reduced hepatic synthesis of clotting factors such as fibrinogen and prothrombin, which is common in patients with advanced hepatic disease.

The observed coagulation abnormalities are consistent with findings,²² who explained that a decrease in the production of coagulation and natural anticoagulants factors habitually presents patients with PT and APTT prolongation in cirrhosis or chronic hepatitis. Another study also affirmed this finding when HCV patients with liver fibrosis were shown to be having seriously impaired clotting functions, who had more severe fibrosis scores.²³

In this study, a relative increase in the prevalence of hepatitis infections was found to be in males than in females. The number of infected subjects was 50, out of which 29 (58%) subjects are male and 21 (42%) are female. The literature indicates that males are prone to HBV-related liver complications and that this may be because of hormonal differences and other lifestyle factors like increased alcohol intake and exposure at work.²⁴ The difference in the levels of ALT and APTT according to gender was also clearer with males being more likely to exhibit abnormality. These observations suggest gender-specific treatment and monitoring approaches, which are justified by the fact that, who indicated higher aggressive hepatotomies in HBV-infected men, which increases their probability of developing hepatocellular carcinoma (HCC).²⁵

LIMITATION

This study has several limitations. The sample was also quite small (n=50), and it may limit the ability to transfer the results to the whole population. Second, the research is cross-sectional and this does not allow the establishment of the cause-effect relationship and progression of the disease in the long term. The researchers were also undertaking it in one region only (Peshawar) that may not be as representative as the clinical aspects of patients of Hepatitis B and C elsewhere in Pakistan.

CONCLUSION

To sum up, it is important to note that in this research, the researchers have identified serious changes in the liver functioning and the coagulation patterns of patients with the infections of Hepatitis B and C in comparison with the healthy people. Higher concentrations of ALT, ALP, and bilirubin were commoner in those participants who were infected especially in males demonstrating active inflammation of liver, and may lead to cirrhosis or hepatocellular carcinoma. Moreover, both HBV and HCV patients have prolonged PT and APTT values which indicate a weakened coagulation system presenting a high risk of complications due to bleeding. The results underline the clinical significance of frequent screening of liver and clotting indices of hepatitis patients to identify liver impairment and to take necessary medical measures in a timely manner.

RECOMMENDATION

It is highly suggested that patients with HBV or HCV condition should routinely monitor the biochemical and hematological levels. These should also involve liver functional tests and coagulation tests to identify the

disease progression at an early age and incorporate a treatment plan based on the same. The promotion of awareness, screening programs, and the necessity of taking antiviral therapy should also be included in the public health programs. Also, more longitudinal research on bigger and more heterogeneous samples is suggested in order to understand deeper the gender-based and disease-specific progression of liver dysfunction and coagulopathy in viral hepatitis.

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