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CORRELATION OF HEPATITIS B AND HEPATITIS C INFECTED CASES WITH LIVER FUNCTION TESTS IN SIR GANGA RAM HOSPITAL LAHORE, PAKISTAN

Original Research

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ABSTRACT

Hepatitis B and C virus (HBV, HCV) remains a global health burden, often leading to progressive liver damage including cirrhosis and hepatocellular carcinoma. Liver function tests (LFTs), including ALT, AST, ALP, bilirubin, and albumin, serve as non-invasive indicators of hepatic inflammation, hepatocellular injury, and synthetic dysfunction. The aim of this study was to determine the correlation of hepatitis B and C infection with abnormalities in liver function tests among patients at Sir Ganga Ram Hospital, Lahore, Pakistan. A cross-sectional study was conducted at the pathology and clinical biochemistry departments. A total of 323 HBV (161) and HCV (162) positive patients were included in the study. Venous blood samples were collected under aseptic conditions and analyzed for liver function parameters. Parameters levels were measured using automated chemistry analyzers Mindray BS-200 and ROCHE COBAS C311. Among 161 HBV-positive patients, ALT, AST and ALP was recorded as 45.2±18.3, 50.5±21.4 and 110.7±34.2 respectively. Among 162 HCV-positive patients, ALT, AST and ALP was recorded as 62.7±22.7, 79.8±24.3 and 129.6±39.1 respectively. HCV infection significantly alters liver enzyme more as compared to HBV. These findings support the importance of regular liver function monitoring to ensure timely diagnosis and management of hepatic complications.

Keywords: Alanine Transaminase, Aspartate Aminotransferases, Hepatitis B, Liver Cirrhosis, Liver Function Tests, Liver Neoplasms, Serum Albumin.

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INTRODUCTION

Hepatitis B virus (HBV) and hepatitis C virus (HCV) constitutes the most prevalent causes of chronic liver diseases worldwide. HBV and HCV transmit primarily through infected blood, sexual contact, and perinatal exposure.[1] South America, Asia, Africa, and Southern Europe report a high endemicity of HBV infection, with over 2 billion people globally exposed and approximately 400 million suffering from chronic infection. In Pakistan, an estimated nine million people are infected, regarding bloodborne infections such as HIV, HBV, and HCV. [2] HBV-induced liver damage is primarily immune-mediated, as the host immune system targets hepatocytes harboring the virus, resulting in hepatic inflammation.[3] Risk factors associated with HBV transmission, include unsafe medical and dental practices, reuse of needles, body piercing, blood transfusions, hospitalizations.[4,5] Hepatitis C virus, by contrast, is an RNA virus of the Flaviviridae family and primarily spreads through direct or indirect blood-to-blood.[6,7] Diagnostic strategies for HBV and HCV are Immunochromatographic Test (ICT) screening, followed by confirmatory liver function tests (LFTs), Enzyme-Linked Immunosorbent Assay (ELISA), and polymerase chain reaction (PCR)[8,9] The aim of the this study was to correlate the effects of hepatitis B and C virus infections with liver enzymes and hepatic function.

MATERIALS AND METHODS

This cross-sectional study was carried out at Sir Ganga Ram Hospital, Lahore, Pakistan, over a four-month period from January 2025 to April 2025. The patients were screened for HBV and HCV, with inclusion criteria comprising individuals aged 18 years and above. Whereas patients with a known history of autoimmune disorders, or malignancies were excluded.[10] Ethical approval was obtained from the Institutional Review Board (IRB). Informed consent was taken from all participants. The collected blood samples were processed using the Mindray BS-200. Elevated ALT and AST levels were considered indicative of hepatocellular injury, while raised ALP and bilirubin suggested cholestatic patterns or bile duct involvement.

RESULTS

The study analyzed a total of 323 patients, with 161 diagnosed with hepatitis B virus (HBV) and 162 with hepatitis C virus (HCV). Liver enzyme levels (ALT, AST, ALP) and markers of liver function (bilirubin, albumin) were significantly more abnormal in HCV patients, indicating that HCV causes more severe liver damage and dysfunction as compared to HBV.

Table 1: Demographic statistics of HBV and HCV Patients (n = 323)

Category	Subgroup	HBV (n = 161)	HCV (n = 162)
Age Group	1–20 years	13 (8%)	10 (6%)
	20–40 years	29 (18%)	36 (22%)
	40–60 years	58 (36%)	65 (40%)
	>60 years	61 (38%)	51 (32%)
Gender	Male	97 (60%)	84 (52%)
	Female	64 (40%)	78 (48%)

Age distribution revealed that the majority of HBV (n = 61) and HCV (n = 65) patients belonged to the >60 and 40–60-year age group respectively. Gender distribution showed that males were more affected in both HBV and HCV groups.

Table 2: Comparison of Liver Enzyme Levels Between HBV and HCV Patients (n = 323)

Liver Enzyme	HBV (n=161) Mean± SD (U/L)	HCV (n=162) Mean± SD (U/L)	t-statistic	p-value
ALT	45.2 ± 18.3	62.7 ± 22.6	-9.48	<0.0001
AST	50.5 ± 21.4	79.8 ± 24.3	-10.88	<0.0001
ALP	110.7 ± 34.2	129.6 ± 39.1	-7.06	<0.0001

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Liver enzyme analysis revealed significantly elevated levels in HCV-infected patients as compared to HBV-infected patients.

Table 3: Liver Function Marker Comparison

Liver Function Marker	HBV (Mean ± SD)	HCV (Mean ± SD)
Total Bilirubin (mg/dL)	1.3 ± 0.5	1.9 ± 0.6
Serum Albumin (g/dL)	3.8 ± 0.6	3.2 ± 0.5

Mean total bilirubin levels were higher in HCV cases (1.9 mg/dL) than in HBV cases (1.3 mg/dL), indicating more severe hepatocellular injury. Mean serum Albumin levels were higher in HBV cases (3.8g/dL) as compared to HCV cases (3.2g/dL).

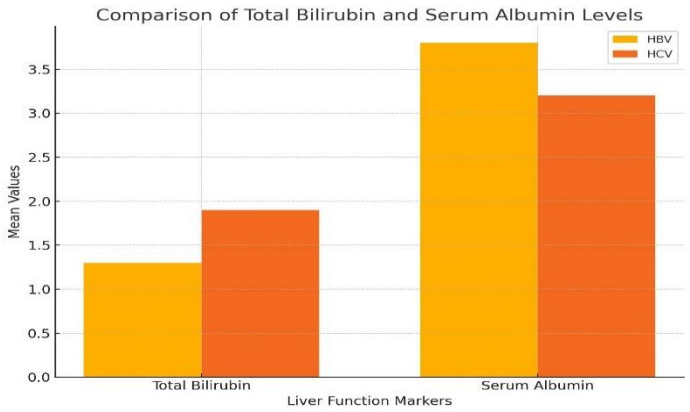

Figure 1 Comparison of Total Bilirubin and Serum Albumin Levels

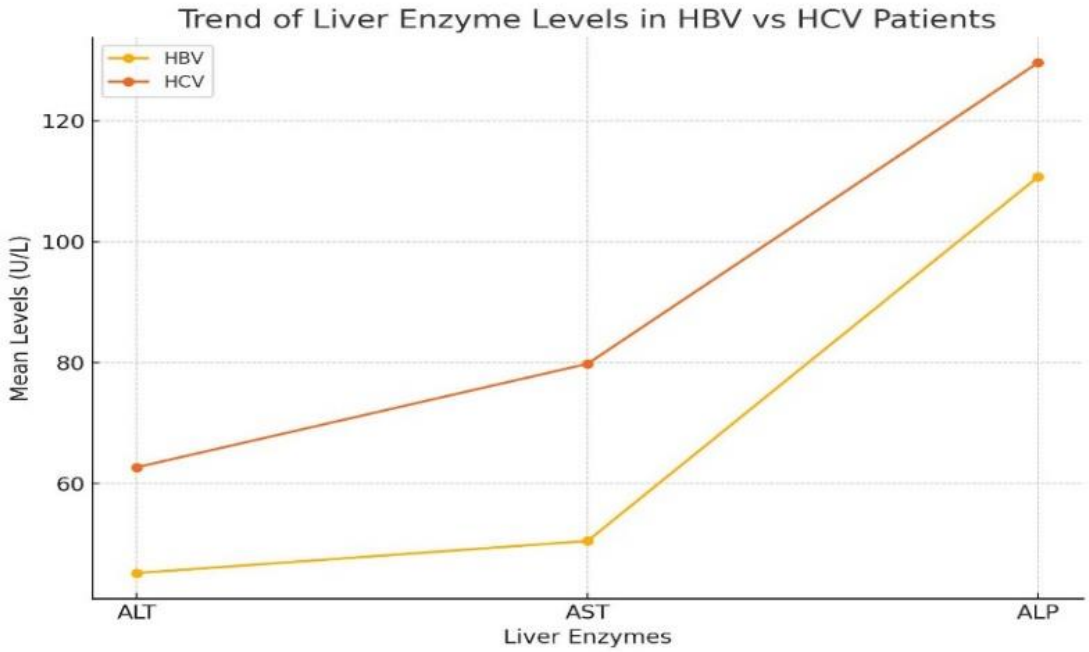

Figure 2 Trend of Liver Enzyme Levels in HBV vs HCV Patients

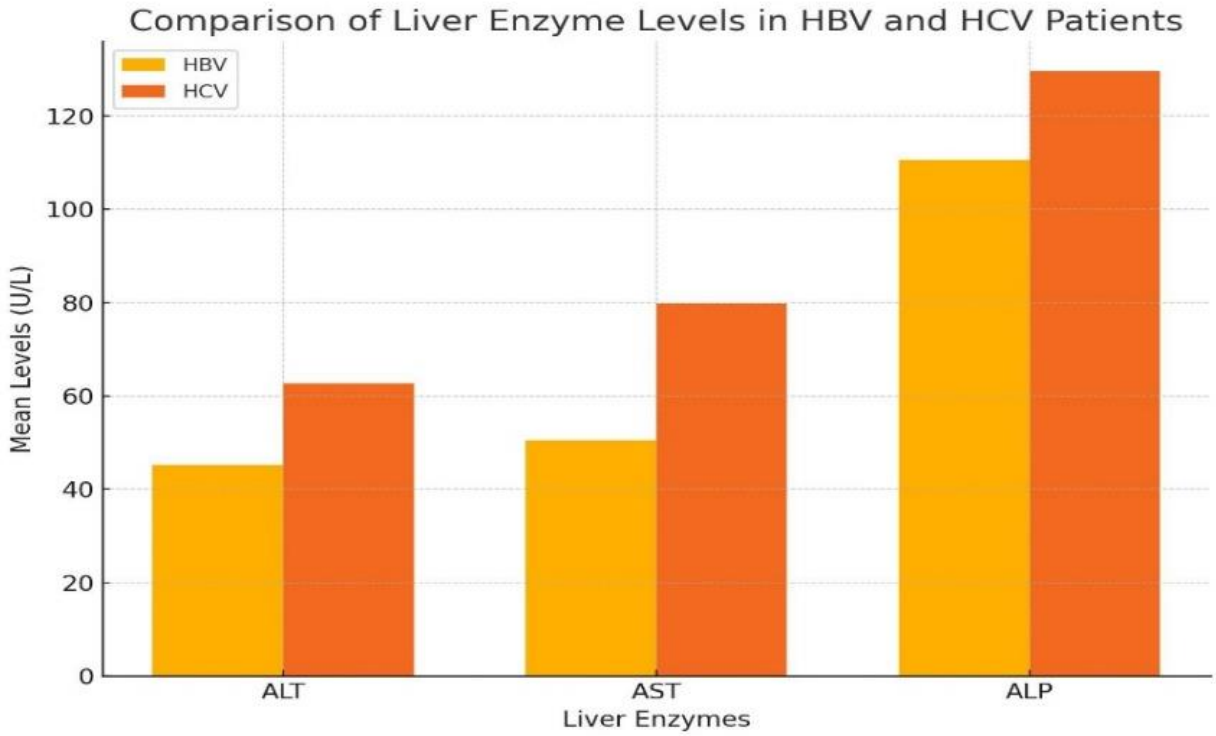

Figure 3 Comparison of Liver Enzyme Levels in HBV vs HCV Patients

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DISCUSSION

This study provided insights into the differential impact of hepatitis B virus (HBV) and hepatitis C virus (HCV) on liver function by analyzing variations in liver enzyme and biochemical marker levels.[11] This enzymatic fluctuation in HBV cases complicates disease monitoring and demands careful clinical interpretation.[12,13] In HCV patients, gradual increase in bilirubin correlated with advancing fibrosis, reflecting chronic deterioration of liver function.[14] This study affirmed that HCV-infected patients exhibited higher bilirubin concentrations than those with HBV.[15] The AST/ALT ratio demonstrated distinct behavior between the two viral infections.[16] ALP was found to be mildly elevated in HCV patients even in early stages of disease. [17] The elevations of liver enzymes in HCV signified a higher likelihood of disease progression, cirrhosis, and HCC.[18] The findings of the present study demonstrated elevated levels of ALT and AST among HCV patients as compared to those with HBV.[19] One of the strengths of this study lies in the evaluation of liver function markers in a sizable sample of HBV and HCV patients. The inclusion of both enzymatic and synthetic liver markers, such as serum albumin and bilirubin, adds depth to the clinical interpretation.[20]

CONCLUSION

This study concludes that hepatitis B and C viruses exert distinct effects on liver function. HCV infection is associated with persistent elevations in liver enzymes, indicating inflammation and a higher risk of progressive liver damage, whereas HBV infection shows variable enzyme patterns linked to phases of viral activity. Bilirubin and alkaline phosphatase emerged as more dependable indicators of advanced liver dysfunction in HCV cases. These findings underscore the clinical value of routine Liver Function Tests as a practical, an accessible means of monitoring disease progression and guiding timely intervention, particularly in resource-limited healthcare settings.

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AUTHOR CONTRIBUTION

Author	**Contribution**
Muhammad Owais	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Hifsa Mobeen*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Muhammad Shahnawaz	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Asma Fatima	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Talha Khalid	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Farman Faiz	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Muhammad Husnain	Contributed to study concept and Data collection Has given Final Approval of the version to be published

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REFERENCES

1. Lim YS. Treatment decisions based on HBV DNA. J Viral Hepat. 2024;31 Suppl 2:36-42.
2. Peng WT, Jiang C, Yang FL, Zhou NQ, Chen KY, Liu JQ, et al. Tenofovir amibufenamide vs tenofovir alafenamide for treating chronic hepatitis B: A real-world study. World J Gastroenterol. 2023;29(44):5907-18.
3. Wang J, Yan X, Zhu L, Liu J, Qiu Y, Li Y, et al. Significant histological disease of patients with chronic hepatitis B virus infection in the grey zone. Aliment Pharmacol Ther. 2023;57(5):464-74.
4. Luo J, Liang X, Xin J, Li J, Li P, Zhou Q, et al. Predicting the Onset of Hepatitis B Virus-Related Acute-on-Chronic Liver Failure. Clin Gastroenterol Hepatol. 2023;21(3):681-93.
5. Ginès P, Castera L, Lammert F, Graupera I, Serra-Burriel M, Allen AM, et al. Population screening for liver fibrosis: Toward early diagnosis and intervention for chronic liver diseases. Hepatology. 2022;75(1):219-28.
6. Zhan J, Wang J, Zhang Z, Xue R, Jiang S, Liu J, et al. Noninvasive diagnosis of significant liver inflammation in patients with chronic hepatitis B in the indeterminate phase. Virulence. 2023;14(1):2268497.
7. Kim GA, Choi SW, Han S, Lim YS. Non-linear association between liver fibrosis scores and viral load in patients with chronic hepatitis B. Clin Mol Hepatol. 2024;30(4):793-806.
8. Liaw YF. Hepatitis B flare: the good, the bad and the ugly. Expert Rev Gastroenterol Hepatol. 2022;16(11-12):1043-51.
9. Chang ML, Liaw YF. Hepatitis B Flare in Hepatitis B e Antigen-Negative Patients: A Complicated Cascade of Innate and Adaptive Immune Responses. Int J Mol Sci. 2022;23(3).
10. Lim YS. Gray zone of hepatitis B virus infection. Saudi J Gastroenterol. 2024;30(2):76-82.
11. Li G, Zhang P, Zhu Y. Artificial liver support systems for hepatitis B virus-associated acute-on-chronic liver failure: A meta-analysis of the clinical literature. J Viral Hepat. 2023;30(2):90-100.
12. Huang DQ, Tran A, Yeh ML, Yasuda S, Tsai PC, Huang CF, et al. Antiviral therapy substantially reduces HCC risk in patients with chronic hepatitis B infection in the indeterminate phase. Hepatology. 2023;78(5):1558-68.
13. Wang P, Zhang L, He J, Zhang G, Ma Y, Lv W, et al. Accuracy of hepatitis B disease surveillance, Gannan prefecture, Gansu province, China; 2017. PLoS One. 2022;17(9):e0274798.
14. Arain MA, Laghari ZA, Samo AA, Memon SF, Shaikh SA, Warsi J. Prevalence and risk factors associated with Hepatitis B and Hepatitis C infection in Mirpurkhas, Sindh, Pakistan. Rawal Medical Journal. 2020;45(4):750
15. Berumen J, Baglieri J, Kisseleva T, Mekeel K. Liver fibrosis: Pathophysiology and clinical implications. WIREs mechanisms of disease. 2021 Jan;13(1):e1499.
16. Mehmood S, Raza H, Abid F, Saeed N, Rehman HM, Javed S, Khan MS. National prevalence rate of hepatitis B and C in Pakistan and its risk factors. Journal of Public Health. 2020;28(6):751-64.
17. pradat, Zaman F, Uzman MH, Shabbir T, Khan NU, Atta S, Shiraz S, Zahid MA, Munir A. Prevalence of Hepatitis C in Liver Cirrhosis Patients: HCV Prevalence in Cirrhosis Patients. Journal of Health and Rehabilitation Research. 2024 Sep 18;4(3):1-4.
18. Ahmad I, Jan H, Malik SM, Ali Q, Haq I, Hassan I, Ullah I, Raza A, Shaukat A, Khalid F, Rehmat N. Comparative Evaluation of ALT & AST Levels of Hepatitis B and C Infected Pregnant Women in Lahore, Pakistan. Annals of RSCB. 2021;25(6):19829-37
19. Saadatifar, H., Mard-Soltani, M., Niayeshfar, A., Shakerian, N., Pouriamehr, S., Alinezhad Dezfuli, D., Khalili, S., Saadatifar, S. and Mashhadi, S.M., 2024. Correlation between plasma biochemical parameters and cardio-hepatic iron deposition in thalassemia major patients. *Scandinavian Journal of Clinical and Laboratory Investigation*, *84*(4), pp.245-251.
20. KHALID S, SHAH N, ZAIDI YA, HASAN MS, JAHANGIR S, REHMAN S. Cardiomyopathy in Cirrhotic Patients and Its Relationship with the Severity of Cirrhosis. Age (years). 2021; 51:9-8.