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ORIGINAL RESEARCH

Hepatitis B and Hepatitis C Co-infections among patients in a Tertiary Care Centre in Western UP

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Abstract
Aim: To analyse hepatitis b and hepatitis c co-infections among patients at tertiary care centre.
Methods: This study was a retrospective analysis of data of patients with chronic liver disease who were tested for both HBV and HCV between January 2022 and December 2022. A total of 2100 patients were included in the analysis. Demographic and clinical data were collected from medical records, including age, sex, and area status. Clinical data included rapid card test results. The primary outcome variable was the presence of co-infection with both HBV and HCV.
Results: Out of 2100 patients, 522 (25%) patients had viral hepatitis infections. 15.2% of patients had HCV mono-infection, 9.2% had HBV mono-infection, and 0.3% had co-infection with both HBV and HCV. Overall 70.3% were male and 29.7% female prevalent to this infection and the most common age group was 21-40 age. The mean age among the study group was 47 years. Approximately 77.8% of cases were from rural regions.
Conclusion: Co-infection with HBV and HCV is relatively uncommon among patients. However, it is still an important issue to consider, as it can lead to more severe liver disease and lower treatment response rates.
Keywords: Hepatitis**,** HBV, HCV, Co-infections

Introduction

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections are among the leading causes of chronic liver disease.[1] According to the World Health Organization, About250 million people are infected with HBV and more than 70 million with HCV. HBV and HCV replicates in hepatocytes, their life cycle are completely different.[2]HBV is a DNA virus that replicates in the nucleus, whereas HCV is an RNA virus that replicatesin the cytoplasm of hepatocytes. HBV-HCV co-infection is more complex than monoinfection with HBV or HCV alone.[3] Co-infection with HBV and HCV can occur in different ways. Because HBV and HCV have same modes of transmission through intravenous drug use, blood transfusion

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and vertical transmission, viruses can be co-transmitted repeatedly.[4]However, HCV-HBV co-infection may also occur by superinfection, meaning one virus is acquired in a patient with pre-existing chronic infection by the other virus. In clinical settings, one contagion is generally dominant over the other. Dominance occurs when there's complementary inhibition of one viral genome by the other contagion when both HBV & HCV are present in the same cell.[5]The dominant contagion replicates laboriously and suppresses replication of the non-dominant contagion. Co dominance refers to near equal replication of both HBV & HCV. Viral serology varies depending on whether the co-infection is non-stop or superinfection. HCV infection meaning anti-HCV and HCV RNA can be detected in the serum.[5]

Importance of studying co-infections among patients

Studying co-infections of HBV and HCV among patients is important for several reasons. Firstly, co-infection is a major risk factor for the progression of liver disease and the development of liver cirrhosis and liver cancer. Secondly, co-infected patients may have poorer treatment outcomes compared to those with mono-infections, due to drug interactions and other factors. Thirdly, co-infection may impact the immune response and natural history of both viruses, potentially affecting disease transmission and prevention strategies.[6]Therefore, understanding the prevalence, risk factors, and clinical implications of co-infection is critical for developing effective prevention and treatment strategies.

Material & methods

Study Design: This retrospective cohort study was conducted using medical records from a tertiary care hospital in Uttar Pradesh.

Study Population: The study population included adult patients who were diagnosed with chronic hepatitis B or C between January 2022 and December 2022. Patients with other causes of liver disease, or who had received liver transplantation, were excludedfrom the study.

Data Collection: Patient data were extracted from the medical records using a standardized data collection form. The following information was collected for each patient: age, sex, comorbidities (diabetes, hypertension), hepatitis B surface antigen [HBsAg], hepatitis C antibody [HCV Ab], and treatment data if any.

Data Analysis: Descriptive statistics were used to summarize the characteristics of the study population. The prevalence of HBV and HCV mono-infection and co-infection was calculated, along with 95% confidence intervals. Multivariate logistic regression analysis was performed to identify risk factors associated with co-infection. All statistical analyses were conducted using SPSS software. A p-value of <0.05 was considered statistically significant.

Limitations: This study had several limitations, including its retrospective design and reliance on medical record data. The study population was limited to patients of few institutions, which may limit generalizability to other populations. Additionally, the study did not include data on viral genotypes, which may have important clinical implications.

Result

A total of 2100 samples were obtained from tertiary care centre, categorized based on socioeconomic status, over the course of a year for the present study.Of the 2100 patients, a total 522 (25%) cases were positive for Hepatitis.**(Figure 1)**

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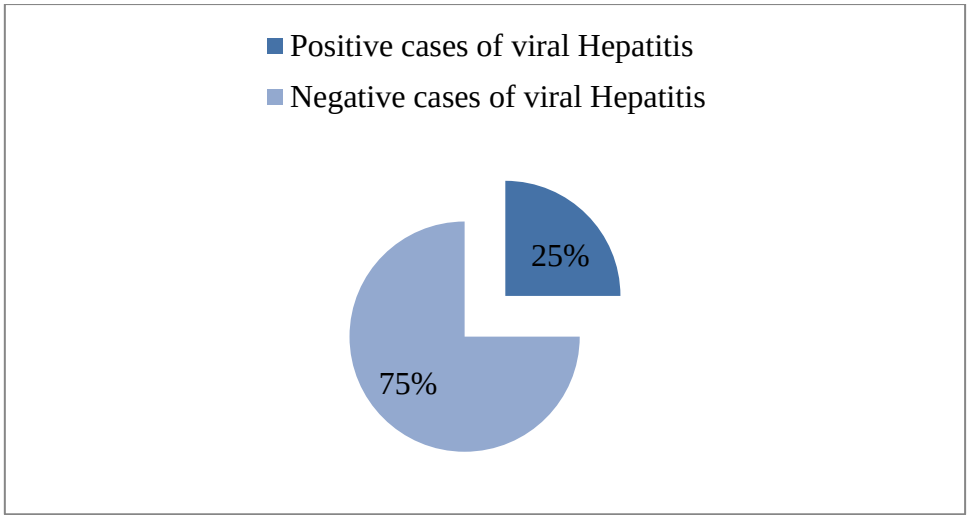

Figure 1: Prevalence of viral Hepatitis

Out of 522 cases of viral hepatitis, 321 (15.2%) cases belong to HCV, were 194 (9.2%) cases of HBsAg and 7 (0.3%) cases of Co-infection with Hepatitis B and Hepatitis C.The overall prevalence of co-infection with HBV and HCV was 0.3%. **(Figure 2)**

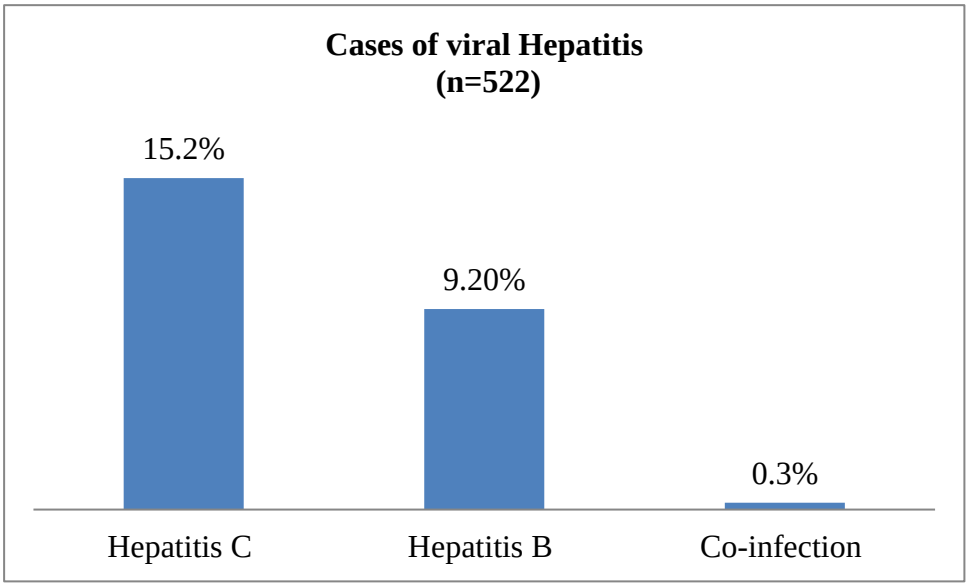

Figure 2: Distribution of viral Hepatitis cases

Data from Table 1 represents diagnosis of Hepatitis C and Hepatitis B, as well as cases of co-infection, categorized by gender.367 (70.3%) of the 522 positive viral cases were detected in males, whereas 155 (29.7%) were detected in females. The majority gender in all viral infection types was male. The average age of study subjects was 47.

Table 1: Sex-wise Distribution of Hepatitis cases

Diagnosis	Gender		Total
	Male	Female	
Hepatitis C	234 (44.8%)	87 (16.6%)	321 (61.4%)
Hepatitis B	128 (24.5%)	66 (12.6%)	194 (37.16%)

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Co-infection	5 (0.9%)	2 (0.4%)	7 (1.3%)
Total	367 (70.3%)	155 (29.7%)	522 (100%)

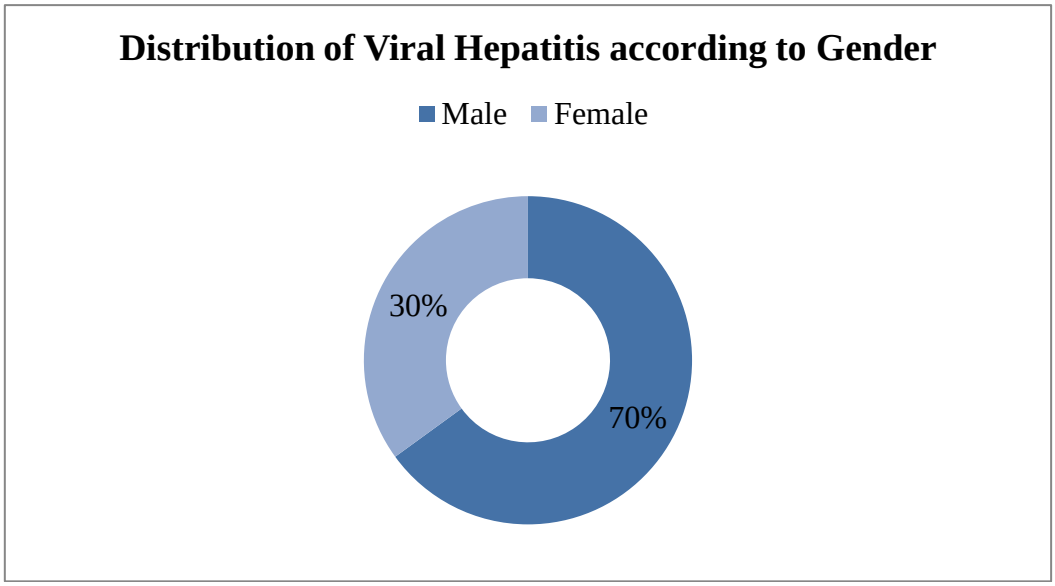

Figure 3: Distribution of viral Hepatitis according to Gender

Of the 522 cases of positive viral infection, 321 cases were identified for havingHCV infection. Out of 321 HCV positive cases, 211 (40.4%) cases were found to be in the 21–40 age group, 78 (15%) cases in the 41–60 age group, 28 (5.4%) cases in the 0–20 age group, and only 4 (0.7%) cases in the age group over 61. In contrast, 78 (15%) of the HBV infected cases were in the 21–40 age group, followed by 55 (10.5%) in the 0–20 age range, 47 (9.0%) in the 41–60 age range, and 14 (2.7%) were above 61 years of age. Fiveout of 7 cases (0.9%) of co-infection with both the Hepatitis B and C viruses were in the age group of 21–40, whereas only one case (0.2%) each belonged to the age group of 41–60 and over 61. No cases of co-infection were discovered in the 0–20 age group. As mention in Table 2 or figure 4.

Table 2: Distribution of Hepatitis cases according to Age group

Diagnosis	Age Group				Total
	0-20	21-40	41-60	Above 61	
Hepatitis C	28 (5.4%)	211 (40.4%)	78 (15%)	4 (0.7%)	321 (61.5%)
Hepatitis B	55 (10.5%)	78 (15%)	47 (9.0%)	14 (2.7%)	194 (37.2%)
Co-infection	-	5 (0.9%)	1 (0.2%)	1 (0.2%)	07 (1.3%)
Total	83 (16%)	294 (56.3%)	126 (24.1%)	19 (3.6%)	522 (100%)

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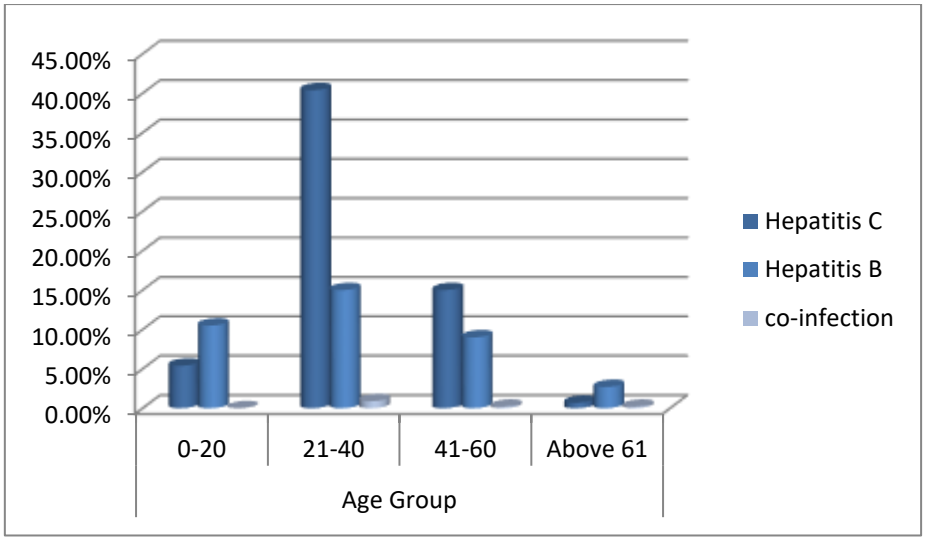

Figure 4: Distribution of viral hepatitis according to age group

Out of 321 cases of hepatitis C, 63 cases belonged to urban areas, whereas 258 cases belonged to rural areas. A total 194 cases of Hepatitis B, 52 cases were resident of urban areas, whereas 142 belonged to rural areas.The Co-infected 7 cases of hepatitis B and C, 6 were resident of urban areas, whereas 1 was in rural areas. As mention in Table No 3.
The majority of cases of viral hepatitis were diagnosed in rural areas, comprising a significant majority of 77.8% of the total cases, while urban areas accounted for a smaller proportion of 22.2% as mention in figure No. 4.

Table 3: Distribution of Hepatitis cases according to area

Diagnosis	Area		Total
	Urban	Rural	
Hepatitis C	63 (12.0%)	258 (49.4%)	321 (61.5%)
Hepatitis B	52 (10%)	142 (27.2%)	194 (37.2%)
Co-infection	1 (0.2%)	6 (1.1%)	7 (1.3%)
Total	116 (22.2%) (22.2%)	406(77.8%) (77.8%)	522 (100%)

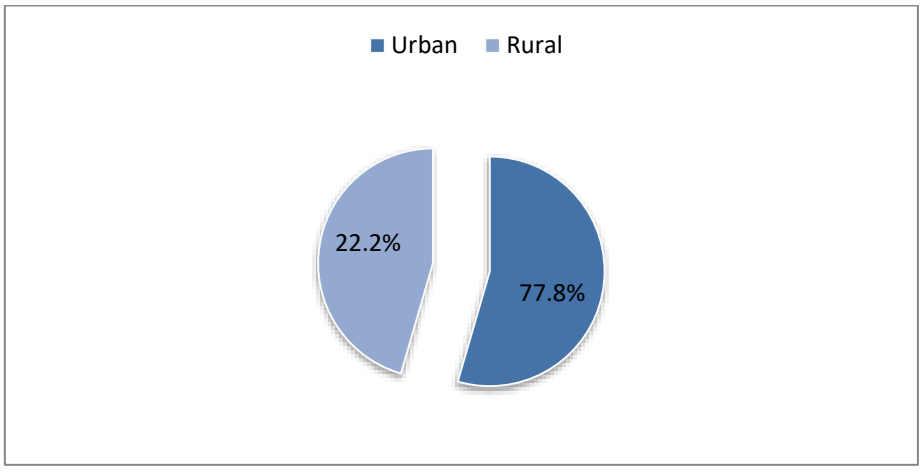

Figure 4: Area wise distribution of total viral Hepatitis cases

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

Discussion

Our study revealed an extremely high prevalence of viral infection (25%) in our region. Similar finding was reported by Ali Set al.,who found 22.2% prevalence of viral infections from the Aligarh region.[7]

In the present study, the seroprevalence of HCV infection in hospital based population was found to be15.2%, a similar finding was reported from eastern India with a prevalence of 14.9% by Ray G et al., (2000).[8]

In our study a high prevalence of 9.2% of Hepatitis B virus infection was reported. On the contrary a low prevalence rate of 3.4% was reported bySingh B et al., (2004)[9] and 3.9% byAgarwal L et al (2018)[10]. India's prevalence of HBsAg was determined to be 1.46% (1.44–1.47).[11] based on a comprehensive review and pooled analysis conducted by Schweitzer et al. on the disease's prevalence across 161 nations.

Lodha et al., (2001) proposed that the prevalence rate of hepatitis B in India is between 1% and 2% in their review study on the disease's epidemiology.[12]There is a high variance in the prevalence across our nation, the Andaman and Arunachal Pradesh aborigines have been claimed to have the greatest prevalence.[13]In patients in Rawalpindi, Pakistan, the prevalence of HBsAg has been observed to be 2.28%.[14]Viral hepatitis B prevalence was determined to be 2.5% in a research done in a hospital-based population at Kathmandu Medical College Hospital, Nepal.[15]

However, the present study reported that 0.3% of patients had dual infection with both HCV and HBV.In India, the seroprevalence of co-infection varies among hospital-based populations with 0.2% reported from Mittal G et al.[16]

As in our study the prevalence rate of viral hepatitis washigh in males compared to females.

It agrees with earlier research showing a greater frequency in men. There could be several reasons behind this like Behavioral Factors (Certain behaviors more common among males, such as higher rates of alcohol consumption, intravenous drug use, or engaging in risky sexual behaviors, can increase the risk of viral hepatitis transmission, Occupational Exposure (Males might be more likely to work in occupations or environments where they are exposed to infectious agents that can lead to viral hepatitis.[17] For example, occupations involving healthcare, sanitation, or contact with body fluids may increase the risk, Healthcare Seeking Behavior is better in women compared to men. This means that males might delay seeking medical attention or testing, allowing viral hepatitis to progress further before diagnosis. Also biological differences between males and females may also affect susceptibility to viral hepatitis or the course of the disease.[18]

Hormonal differences, genetic factors, or differences in immune response might contribute to the variation in prevalence rates.[19]Underreporting or underdiagnosis of viral hepatitis cases in females may be due to various social, cultural, or economic factors.[20] Women might face barriers in accessing healthcare or testing for viral hepatitis, leading to lower reported prevalence rates. Same data is also showed by Agarwal Let al.[21]On the other hand, research by Mittal G et al.[16] revealed that hepatitis infection is more common in women than in men.

Only 22.2% of participants were from urban areas, while 77.8% ofparticipants were from rural areas. According to studies by Agarwal et al.,[21]patients are more likely to live in rural areas than in cities. The reason for more prevalence in rural compared to urban population is less awareness, low literacy rate and inadequate healthcare facilities, which might contribute to more of blood born infections.

Conclusion

Co-infection with HBV and HCV is relatively uncommon among patients. However, it is still an important issue to consider, as it can lead to more severe liver disease and lower treatment response rates. The majority of patients in this study had either HCV or HBV mono-infection,

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indicating that these are still prevalent infections and should not be overlooked. It is noteworthy that the mean age of patients in this study was 47 years, which suggests that screening and prevention efforts should focus on older populations who may have been exposed to these viruses for a longer period of time. Further research is needed to explore the risk factors and clinical outcomes associated with HBV and HCV co-infection, as well as to develop tailored treatment approaches that can improve outcomes for these patients. Overall, the results of this study underscore the importance of continued surveillance and management of both HBV and HCV infections in clinical practice and public health policy.

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