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SEROPREVALENCE AND CLINICO-EPIDEMIOLOGICAL PROFILE OF CHRONIC HEPATITIS B AND C PATIENTS IN A TERTIARY HOSPITAL

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ABSTRACT: This descriptive observational study was conducted at Government Medical College and Dr. Susheela Tiwari Memorial Government Hospital, Haldwani, Uttarakhand, to evaluate the seroprevalence and clinico-epidemiological profile of chronic Hepatitis B (HBV) and Hepatitis C (HCV) among patients. Over a two-year period, 7,149 outpatients were screened, identifying 38 HBV-positive cases (0.53%) and 141 HCV-positive cases (1.97%). Patients were assessed using detailed clinical evaluations, laboratory tests, and imaging studies, with data analyzed through SPSS. The majority of patients with HCV presented with advanced liver disease, as evidenced by higher rates of ascites (13.97%), jaundice (11.73%), and elevated urea levels (p=0.03), while HBV patients exhibited significantly higher serum bilirubin (p=0.005) and SGOT levels (p=0.0057). Sociodemographic analysis revealed no significant differences in age, gender, or education between groups, but geographic patterns showed HBV predominance in Nainital (63.2%) and HCV dominance in Udham Singh Nagar (27.7%) and Bijnor (29.1%). These findings underscore the urgent need for targeted interventions, including awareness campaigns, preventive measures, and region-specific healthcare strategies, to reduce the burden of viral hepatitis in underserved populations.

INTRODUCTION: Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are major global public health challenges, affecting millions of people and contributing substantially to the global burden of chronic liver diseases [1]. Chronic HBV affects over 350 million individuals worldwide, with an estimated 2 billion people exposed, leading to more than 600,000 deaths annually.

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Similarly, chronic HCV impacts around 170 million individuals and accounts for nearly 500,000 deaths each year [2]. Both infections are associated with severe complications, including cirrhosis and hepatocellular carcinoma, resulting in high morbidity and mortality rates. These alarming statistics highlight the critical need for comprehensive research into the prevalence, risk factors, and clinical implications of HBV and HCV.

The South-East Asia Region (SEAR) of the World Health Organization (WHO) carries approximately 30% of the global hepatitis burden, with India being a key contributor. In India, the prevalence of chronic HBV is estimated to be between 3-4%,

while HCV affects approximately 1% of the population. Transmission patterns vary significantly, with vertical transmission being a major cause of chronic HBV infections, especially when acquired in early childhood. For HCV, prevalence tends to increase with age and is often detected incidentally during unrelated health screenings. These regional variations emphasize the importance of localized studies to better understand the epidemiology and clinical burden of these infections, particularly in resource-limited settings.

Diagnosing HBV and HCV poses unique challenges due to overlapping symptoms with other forms of viral hepatitis. Laboratory testing plays a pivotal role, with hepatitis B surface antigen (HBsAg) being the primary diagnostic marker for HBV, while for HCV, antibody testing indicates exposure but requires confirmatory tests to determine active infection [3]. Advances in diagnostic technologies, including enzyme immunoassays (EIAs) and molecular tests, have improved accuracy and accessibility, yet significant gaps remain in low-resource regions. These diagnostic challenges underscore the need for reliable, cost-effective, and widely available tools, especially in regions with high disease prevalence [10].

Preventive measures, particularly HBV vaccination, have significantly reduced the prevalence of chronic HBV infections. India integrated the hepatitis B vaccine into its national immunization program in 2005, achieving nationwide coverage by 2011 [4]. However, the absence of an effective vaccine for HCV places greater emphasis on prevention through public awareness, early detection, and targeted treatment strategies. Research into novel HCV vaccine candidates is ongoing, offering hope for future disease control [11].

This study aims to address the existing knowledge gaps by evaluating the seroprevalence and clinico-epidemiological profile of chronic HBV and HCV in the Kumaon region of Uttarakhand. By analyzing demographic patterns, clinical presentations, and laboratory findings, this research seeks to provide region-specific insights into the burden of these infections. Additionally, it aims to identify high-risk groups, inform public health policies, and guide the development of targeted interventions to reduce prevalence and improve healthcare outcomes for affected populations.

The study by Ingle *et al.*[5] concluded that Hepatitis C was most prevalent among children aged 0–10 years, with thalassemia and multiple blood transfusions identified as significant risk factors, emphasizing the need for targeted screening and early intervention in high-risk populations. Dagnew *et al.*[6] highlighted intermediate seroprevalence rates of HBV (4.6%) and HCV (1.6%) among pregnant women, identifying factors such as multiple sexual partners, blood transfusions, family history of HBV, and HIV coinfection as significant predictors, stressing the importance of integrated screening, prevention, and education programs for this demographic. Sharma *et al.*[7] revealed an HCV prevalence of 8.33% in Jammu and Kashmir, with genotypes 3 and 1 predominating, underscoring the need for larger studies to map epidemiological trends and guide targeted interventions to mitigate the burden of chronic liver disease. Wang *et al.*[8] found a low prevalence of HBV immunization (38.9%) but a high HBV infection rate (26.5%) among Chinese MSM, with strong associations between sexual risk factors and HBV infection, emphasizing the necessity for enhanced vaccination programs, health education, and targeted preventive measures within this group.

MATERIAL & METHODOLOGY: This descriptive observational study was conducted at the Government Medical College and associated Dr. Susheela Tiwari Memorial Government Hospital, Haldwani, Uttarakhand, from November 2022 to November 2024. The primary aim was to evaluate the seroprevalence and clinico-epidemiological profiles of chronic Hepatitis B (HBV) and Hepatitis C (HCV) patients attending this tertiary care hospital. The objectives included assessing the demographic and clinical characteristics of these patients, identifying key risk factors, and evaluating the laboratory and imaging findings to better understand disease patterns and inform public health strategies.

The study enrolled 179 patients (38 HBV-positive and 141 HCV-positive) identified from a total of 7,149 screened outpatients using purposive sampling. Inclusion criteria consisted of adults

aged 18 years or older with a confirmed serological or molecular diagnosis of chronic HBV or HCV infection. Patients with co-infections (e.g., HIV, Hepatitis D, or acute HBV/HCV infections), pregnant women, or those with severe chronic illnesses that could confound study outcomes were excluded.

Data collection involved structured interviews to document patient demographics, risk factors (e.g., blood transfusions, tattoos, intravenous drug use), and symptoms such as jaundice, fatigue, or abdominal pain. A thorough clinical examination assessed physical signs like hepatomegaly, splenomegaly, and icterus. Blood samples were collected and analyzed using the enzyme-linked immunosorbent assay (ELISA) method to detect HBV surface antigen (HBsAg) and HCV antibodies. Additional investigations included complete blood count (CBC), liver function tests, renal function tests, and imaging studies like abdominal ultrasound and FibroScan to evaluate liver fibrosis and structural abnormalities.

Statistical analysis utilized SPSS software (version 20), employing descriptive statistics (means, medians, and percentages) and inferential tests like chi-square for categorical variables and t-tests for continuous variables. Logistic regression models were applied to assess risk factor associations, with statistical significance set at $p < 0.05$. This comprehensive methodology ensured a robust evaluation of the seroprevalence and clinical implications of chronic HBV and HCV in the study population.

Imaging findings were corroborated using abdominal ultrasound, non-contrast computed tomography (NCCT), or contrast-enhanced computed tomography (CECT), and upper gastrointestinal endoscopy was performed where indicated. For patients with advanced disease features, diagnostic ascitic fluid analysis and liver stiffness assessments were undertaken. Ethical clearance was obtained from the institutional review board, and all participants provided informed consent prior to enrolment *via* IEC Committee approval number-682. This meticulous approach aimed to generate actionable insights into the burden of HBV and HCV in the Kumaon region, fostering better prevention, diagnosis, and management strategies tailored to local healthcare needs.

RESULTS & DISCUSSION: This study evaluated the seroprevalence and clinico-epidemiological profiles of chronic Hepatitis B (HBV) and Hepatitis C (HCV) among 179 patients diagnosed at a tertiary care hospital in Uttarakhand. From a total of 7,149 screened outpatients, the seroprevalence of HBV was 0.53% (n=38), and HCV was 1.97% (n=141), reflecting higher rates of HCV in this population. This aligns with global trends where HCV, driven by unsafe medical practices, shows a higher prevalence in resource-limited regions.

Geographically, there were notable regional variations in prevalence. HBV cases were predominantly from Nainital (63.2%), while HCV cases were widely distributed, with the highest proportions in Bijnor (29.1%), Udham Singh Nagar (27.7%), and Nainital (28.4%). These findings indicate that HCV has a broader geographic spread, possibly influenced by regional risk factors such as blood transfusions and unsafe injections. This has been depicted in **Table 1.** The p-value of 0.002 in this table indicates a statistically significant association between the geographic distribution of patients and their hepatitis status (HBV or HCV). This suggests that the prevalence of HBV and HCV varies significantly across different districts. The chi-square value of 29.66 further supports the strength of this association.

TABLE 1: GEOGRAPHIC DISTRIBUTION OF HBV AND HCV PATIENTS

District	Hep B	Hep C	Total
Almora	1	2	3
Bageshwar	1	0	1
Bareilly	2	6	8
bijnor	2	41	43
Haridwar	1	0	1
Moradabad	0	5	5
Nanital	24	40	64
Pilbhit	1	2	3
Pithorgarh	1	4	5
Rampur	0	1	1
Sitapur	0	1	1
Udham Singh Nagar	5	39	44
Total	38	141	179
Chi-Sq Value= 29.66, P-Value= 0.002 (Significant)			

Demographically, the mean age of HBV patients was 44.89 ± 14.48 years, while HCV patients were

slightly younger at 41.7 ± 14.89 years. Both groups demonstrated a male predominance, with 65.8% of HBV cases and 63.8% of HCV cases being male. This gender disparity reflects greater exposure to risk factors such as occupational hazards and cultural practices among males. Socioeconomic analysis revealed that the majority of patients belonged to the lower middle (38.55%) and upper lower (28.49%) socioeconomic classes, suggesting a correlation between low income and limited healthcare access. Education levels also showed significant variation, with 36.31% of patients being illiterate, particularly among females. Low literacy may contribute to delayed diagnosis and poor awareness of preventive measures. Risk factor analysis identified distinct patterns between HBV and HCV. In HCV patients, past blood transfusions (29.05%)**,** unsafe injections (30.17%) and tattooing (10.63%) were major contributors, consistent with the disease's parenteral transmission route.

In contrast, HBV patients reported shaving by barbers (13.91%), a culturally significant practice in rural areas, as a notable risk factor.

These findings underscore the urgent need for infection control measures and public education about safe medical and cosmetic procedures.

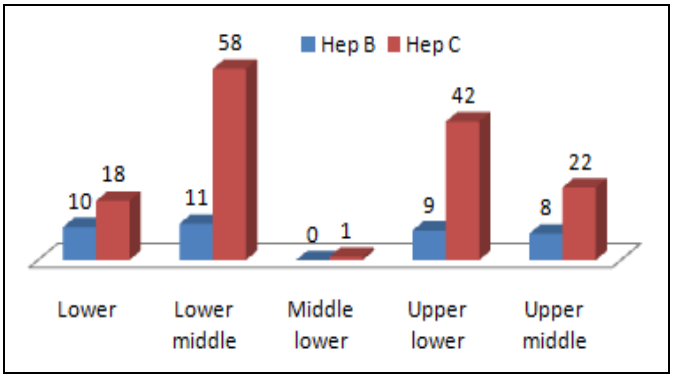

FIG. 1: SOCIODEMOGRAPHIC PROFILE OF HBV AND HCV PATIENTS

TABLE 2: RELEVANT PAST HISTORY IN BOTH GROUPS OF PATIENTS

Past history	Hep B(N=41)	Hep C(N=141)	P value
Past history of blood transfusion	14(7.82%)	52(29.05%)	0.99
Past history of surgery Present	3(1.68%)	15(8.38%)	0.62
Past unsafe injection	13(7.26%)	54(30.17%)	0.64
High risk behavior	6(3.35%)	31(17.32%)	0.40
HIV Positive	1(0.56%)	5(2.79%)	0.78
Hemodialysis present	1(0.56%)	7(3.91%)	0.54
IV Drug User	1(0.56%)	6(3.35%)	0.64
Tatoo making	11(6.15%)	30(16.76%)	0.32
Body piercing	13(7.26%)	51(28.49%)	0.82
History of shaving by barber	25(13.91%)	89(49.72%)	0.76

The analysis of clinical manifestations reveals significant differences between Hepatitis B (HBV) and Hepatitis C (HCV) patients, particularly for ascites and jaundice. Ascites was more prevalent in HCV patients (13.97%) compared to HBV patients (7.82%), with a statistically significant p-value of 0.01, indicating a higher tendency for HCV to progress to decompensated liver disease. Similarly, jaundice was observed more frequently in HCV cases (11.73%) than HBV cases (7.82%), with a highly significant p-value of 0.002, reflecting greater liver dysfunction in HCV. Other symptoms, such as hematemesis, malena, chronic liver disease, pedal edema, anorexia, and malaise, showed higher prevalence in HCV patients, but the differences were not statistically significant, as indicated by p-values ranging from 0.20 to 0.58. These findings highlight that while both HBV and HCV cause similar clinical features, HCV is more strongly associated with advanced liver disease manifestations, emphasizing the importance of timely diagnosis and management to prevent complications in HCV patients.

TABLE 3: CLINICAL PARAMETER OF STUDY SUBJECTS WITH HEP B AND HEP C

	HEP B	HEP C	P value
Ascites	14(7.82%)	25(13.97%)	0.01
Jaundice	14(7.82%)	21(11.73%)	0.002
Hematemesis	4(2.23%)	7(3.91%)	0.21
Malena	5(2.79%)	13(7.26%)	0.46
Chronic liver disease	19(10.61%)	47(26.26)	0.058

Pedal edema	23(12.85%)	55(30.73%)	0.38
Anorexia	24(13.41%)	104(58.1%)	0.20
Malaise	28(15.64%)	97(54.19%)	0.56

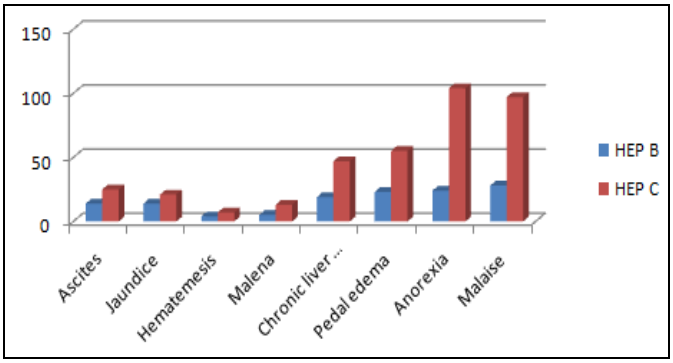

FIG. 2: CLINICAL PARAMETER OF STUDY SUBJECTS WITH HEP B AND HEP C

The laboratory findings reveal notable differences in liver function and injury markers between Hepatitis B (HBV) and Hepatitis C (HCV) patients. HBV patients exhibited significantly higher serum bilirubin levels (2.53 ± 3.12 mg/dL) compared to HCV patients (1.71 ± 1.71 mg/dL, p = 0.03), indicating more pronounced liver inflammation or cholestasis in HBV cases. Similarly, SGOT levels were markedly elevated in HBV patients (147.74 ± 217.32 U/L) compared to HCV patients (84.37 ± 83.19 U/L, p = 0.005), reflecting acute hepatocellular injury. Additionally, total albumin levels were significantly lower in HBV patients (3.21 ± 0.62 g/dL) than in HCV patients (3.54 ± 0.68 g/dL, p = 0.006), suggesting greater impairment in liver synthetic function among HBV cases. In contrast, other parameters, including platelet count, INR, SGPT, LDH, and total protein levels, showed no statistically significant differences between the two groups (p >0.05). These findings underscore that HBV patients are more likely to present with markers of acute liver inflammation and reduced synthetic function, whereas HCV exhibits a relatively milder hepatic profile, emphasizing the need for tailored diagnostic and therapeutic approaches for these infections.

TABLE 4: VARIOUS LABORATORY PARAMETER OF PATIENTS DIAGNOSED WITH HEPATITIS B AND HEPATITIS C

	Hep B	Hep C	P value
Platelet	23501.06±42204.65	45866.9±159138	0.39
International Normalized Ratio (INR)	1.63+-0.64	1.56+-0.97	0.67
Serum bilirubin levels	2.53+-3.12	1.71+-1.71	0.03
SGOT	147.74+-217.32	84.37+-83.19	0.005
SGPT	124.08+-199.91	89.1+-88.91	0.11
LDH	186.76+-93.04	191.22+-100.42	0.80
Total Protein	6+-1.06	6.14+-0.88	0.41
Total Albumin	3.21+-0.62	3.54+-0.68	0.006

The analysis of Child-Turcotte-Pugh (CTP) scores highlights differences in liver disease severity between Hepatitis B (HBV) and Hepatitis C (HCV) patients, although the p-value (0.1092) indicates no statistically significant association. Among patients with Child A scores (5 and 6), representing compensated liver disease, HCV cases accounted for a higher proportion (7.27%) compared to HBV cases (3.36%), suggesting a slightly greater frequency of early-stage disease in HCV. In the Child B category (scores 7–9), which indicates moderate liver dysfunction, HCV patients were more prominent, with notable frequencies at scores of 7 (3.91%) and 8 (4.47%), while HBV patients contributed minimally to this category.

TABLE 5: CHILD-TURCOTTE-PUGH (CTP) SCORES AMONG PATIENTS IN BOTH GROUPS

Child CTP	Diagnosis			p-value
	Hep B	Hep C	Total	
Child A ctp 5	3	3	6	0.1092
	1.68%	1.68%	3.35%	
Child A ctp 6	3	10	13	
	1.68%	5.59%	7.26%	
Child b ctp 7	0	7	7	
	0%	3.91%	3.91%	

Child b ctp 8	2	8	10
	1.12%	4.47%	5.59%
Child b ctp 9	3	4	7
	1.68%	2.23%	3.91%
Child c ctp 11	3	7	10
	1.68%	3.91%	5.59%
Child c ctp 13	2	2	4
	1.12%	1.12%	2.23%
Child c ctp10	1	5	6
	0.56%	2.79%	3.35%
Child c ctp12	2	1	3
	1.12%	0.56%	1.68%
NA	19	94	113
	10.61%	52.51%	63.13%

The Child C category (scores 10–13), representing severe liver dysfunction, also showed higher proportions of HCV patients, particularly at scores of 10 (2.79%) and 11 (3.91%), reflecting the advanced disease progression commonly associated with HCV. However, a significant portion of patients was classified as not available (NA), comprising 10.61% of HBV and 52.51% of HCV cases, which limits a comprehensive interpretation. These findings underscore HCV's propensity for progressing to more advanced stages of liver dysfunction compared to HBV.

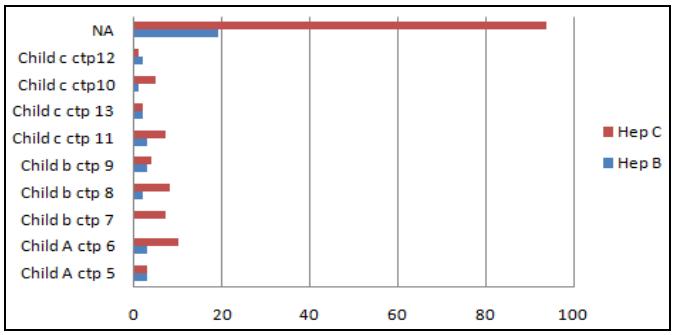

FIG. 3: CHILD-TURCOTTE-PUGH (CTP) SCORES AMONG PATIENTS IN BOTH GROUPS

These findings reflect the multifactorial nature of HBV and HCV in the Kumaon region, influenced by socioeconomic, geographic, and cultural factors. HCV's higher prevalence and more advanced disease stage suggest that it remains under diagnosed and underreported, particularly in high-risk populations such as those receiving blood transfusions or unsafe injections. Public health interventions focusing on early detection, vaccination (for HBV), and awareness campaigns targeting high-risk groups are crucial. Enhanced diagnostic facilities and region-specific prevention strategies are essential to address the burden of chronic viral hepatitis and its complications.

DISCUSSION: This study highlights several significant findings regarding the seroprevalence and clinico-epidemiological profiles of chronic Hepatitis B (HBV) and Hepatitis C (HCV) in the Kumaon region of Uttarakhand. The seroprevalence of HCV (1.97%) was notably higher than HBV (0.53%), aligning with global observations that emphasize HCV's dominance in resource-limited regions. Geographic variations were evident, with HBV cases predominantly reported in Nainital (63.2%) and HCV cases more widely distributed, particularly in Bijnor (29.1%) and Udham Singh Nagar (27.7%). This highlights the role of regional risk factors and healthcare practices in disease distribution.

Sociodemographic analysis revealed that both HBV and HCV predominantly affected males and individuals from lower socioeconomic classes. These groups are more likely to encounter occupational and cultural risk factors, including unsafe medical practices and traditional barbering, which were strongly associated with HBV transmission. In contrast, HCV cases were significantly linked to blood transfusions and unsafe injections, underscoring gaps in infection control measures.

Clinically, HBV patients presented with acute hepatic inflammation, as evidenced by elevated serum bilirubin and SGOT levels, while HCV patients exhibited features of advanced liver disease, including ascites and jaundice. The Child-Turcotte-Pugh (CTP) score analysis further revealed that HCV cases were more likely to progress to decompensated liver disease, indicating a delayed diagnosis and management. These findings underscore critical gaps in awareness,

early detection, and preventive measures. They highlight the need for targeted public health interventions to address region-specific risk factors and improve access to healthcare services, especially for high-risk populations. Enhanced diagnostic facilities and education campaigns focusing on safe medical and cultural practices are essential to reducing the burden of chronic hepatitis in the Kumaon region.

CONCLUSION: This study highlights significant differences in the seroprevalence and clinico-epidemiological profiles of chronic Hepatitis B (HBV) and Hepatitis C (HCV) in the Kumaon region of Uttarakhand. HCV was more prevalent as compared to HBV, with distinct regional variations, including a higher concentration of HCV cases in Udham Singh Nagar, Bijnor and Nainital. The demographic profile revealed a male predominance in both groups and a higher prevalence among individuals from lower socioeconomic classes, underscoring disparities in healthcare access and awareness.

HCV patients were more likely to present with advanced liver disease, as evidenced by higher rates of ascites, jaundice, and advanced Child-Turcotte-Pugh (CTP) scores, while HBV patients exhibited more acute liver inflammation with significantly elevated serum bilirubin and SGOT levels[9]. Risk factor analysis indicated that unsafe medical practices, such as unregulated blood transfusions and injections, were significant contributors to HCV transmission, whereas cultural practices like barber shaves were more associated with HBV. These findings underscore the need for targeted public health interventions, including vaccination campaigns for HBV, stricter infection control measures, and education on safe medical and cosmetic practices. Enhanced diagnostic and treatment facilities, coupled with awareness programs in high-prevalence regions, are essential to mitigate the burden of chronic viral hepatitis and prevent progression to advanced liver disease. Future research should focus on identifying additional regional risk factors and evaluating the long-term effectiveness of preventive measures.

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CONFLICT OF INTEREST: The authors declare no conflict of interest regarding the publication of this research paper. The study was conducted independently, without any financial or institutional influence that could have affected the research design, data collection, analysis, or interpretation of findings. All authors affirm their commitment to transparency and objectivity in presenting the results of this study.

REFERENCES:

1. Russo FP, Zanetto A, Pinto E, Battistella S, Penzo B and Burra P: Hepatocellular carcinoma in chronic viral hepatitis: where do we stand? Int J Mol Sci 2022; 23(1): 500.
2. Asad M, Ahmed F, Zafar H and Farman S: Frequency and determinants of Hepatitis B and C virus in general population of Farash Town, Islamabad. Pakistan J Med Sci 2015; 31(6): 1394
3. Yazdani Y, Roohi A, Khoshnoodi J and Shokri F: Development of a sensitive enzyme-linked immunosorbent assay for detection of hepatitis B surface antigen using novel monoclonal antibodies. Avicenna J Med Biotechnol 2010; 2(4): 207.
4. Puri P: Tackling the hepatitis B disease burden in India. J Clin Exp Hepatol 2014; 4(4): 312–9.
5. Ingle R, Chaya AK, Chavan S, Taklikar S and Baveja S: A study of seroprevalence and the associated risk factors of hepatitis C at a tertiary care hospital in Mumbai. ClinEpidemiol Glob Heal 2023; 23: 101356
6. Dagnew M, Million Y, Destaw B, Adefris M, Moges F and Tiruneh M: Knowledge, attitude, and associated factors towards vertical transmission of Hepatitis B Virus among

pregnant women attending antenatal care in tertiary hospitals in Amhara Region, Northwest Ethiopia: a Cross-Sectional Study. Int J Womens Health 2020; 859–68.
7. Sharma M, Sharma M, Sehgal S, Sudhan SS, Razdan K and Pandita B: Epidemiology and Genotypes of Hepatitis C Virus: A First Study from Jammu (J&K), India. J Gastrointest Infect 2017; 7(1): 9–14.
8. Wang F, Song H, Xu F, Xu J, Wang L and Yang F: Role of hepatitis B virus non-structural protein HBx on HBV replication, interferon signaling, and hepatocarcinogenesis. Front Microbiol 2023; 14: 1322892. World Health Organization. Interim guidance for country validation of viral hepatitis elimination. World Health Organization 2021.
9. Assefa A, Kiros T and Delelegn B: Seroprevalence and Associated Factors of HBV and HCV among Pregnant Women Attending Antenatal Care at Debre Tabor Comprehensive Specialized Hospital, Northwest Ethiopia: A Cross-Sectional Study. Int J Microbiol 2023; 2023(1): 2282673.
10. Usuda D, Kaneoka Y, Ono R, Kato M, Sugawara Y and Shimizu R: Current perspectives of viral hepatitis. World J Gastroenterol 2024; 30(18): 2402.
11. Aron JS, Kerr CA, Bernstein DE, Flanigan C, Hoffmann CJ and Gonzalez CJ: Hepatitis C Virus Screening, Testing, and Diagnosis in Adults 2023.

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