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Seroprevalence of Hepatitis B virus and Associated factors among adult Chronic liver disease patients at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia

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Abstract

Background: *Hepatitis B virus infection is a global health problem with the highest prevalence in Asia and Sub-Saharan countries. It causes both acute and chronic hepatitis, with complications including cirrhosis and hepatocellular carcinoma. Hence, this study aimed to determine the seroprevalence of hepatitis B virus and associated factors among chronic liver disease patients at University of Gondar Comprehensive Specialized Hospital.*

Methods: *An institutional-based cross-sectional study was conducted at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, from May to September 2021. Data was collected by face-to-face interview using structured questionnaire from the patients' medical record, and a laboratory test was done on a blood sample for HBsAg and hepatitis C virus antibody. Data was entered using Epi-data 4.6 and exported to SPSS version 26 for analysis. Descriptive analysis was done for the sociodemographic characteristics of the participants. Bivariate and multivariate logistic regression analysis were employed, and the odds ratio using a confidence interval of 95% was retrieved. P-value <0.05 was taken as significant.*

Results: *A total of 227 chronic liver disease patients were enrolled. The mean age of participants was 44.04 (±12.4). Most (84.6%) of them were males, and females account 15.4%. The prevalence of hepatitis B virus infection was 34.8% (95% CI 28.8-41) among chronic liver disease patients. An increased proportion of hepatitis B virus were detected in males (AOR=4.0;95% CI=1.21,13.23). Contact to jaundiced patients (P=0.01), having multiple sexual partners (P=0.001), and hepatitis C virus co-infection (P=0.008) were significantly associated with Hepatitis B virus infection among Chronic liver disease patients.*

Conclusions: *The prevalence of hepatitis B virus infection among Chronic liver disease patients at University of Gondar Comprehensive Specialized Hospital was high. Male gender, having multiple sexual partners, contact to jaundiced patients, and hepatitis C virus co-infection were predominant factors for hepatitis B virus infection among chronic liver disease patients. Therefore, Proper health education and media campaign should be conducted with the general population to inform them about the risk factors of HBV infection and its routes of transmission. Further multicenter studies of high-risk behavior could also be encouraged.*

Keywords: Chronic Liver Disease, Hepatitis B Virus, Prevalence, Ethiopia.

List of Abbreviations

AIDS: Acquired Immunodeficiency Syndrome, Anti-HCV: Antibody of hepatitis C Virus, AOR: Adjusted Odds Ratio, CI: Confidence Interval, CLD: Chronic Liver Disease, COR: Crude Odds Ratio, DNA: Deoxyribonucleic Acid, HBsAg: Hepatitis B Surface Antigen, HBV: Hepatitis B Virus, HCC: Hepatocellular carcinoma, HCV: Hepatitis C Virus, HIV: Human Immunodeficiency Virus, HSS: Hepatosplenic Schistosomiasis, IRB: Institutional Review Board, PCR: Polymerase Chain Reaction, SPSS: Statistical Package for Social Sciences ,UoGCSH: University of Gondar Comprehensive Specialized Hospital.

1. Back Ground

Hepatitis B virus (HBV) is an enveloped double-stranded circular DNA genome and is classified within the family of Hepadenaviridae. It is a highly contagious pathogen that has become a severe public health problem and a major cause of morbidity and mortality, particularly in Asia and sub-Saharan countries [1,2]. The prevalence of chronic HBV infection varies widely due to geographic area and predominant routes of transmission. It varies widely from high (>8%) to intermediate (2%-7%) and low (<2 %). Worldwide, about 2 billion persons have been infected with HBV; an estimated 350-400 million are chronically infected, of whom at least 65 million are in Africa [3-5]. The predominant mode of HBV transmission varies in different geographic areas. It can be transmitted vertically from mother to child or horizontally through sexual intercourse, tattooing, blood transfusion, during surgery, or contact to body fluid of infected individuals [6]. HBV is the cause of potentially life-threatening liver infection. It causes both acute hepatitis and chronic hepatitis, with complications including cirrhosis and hepatocellular carcinoma (HCC), collectively called chronic liver disease (CLD). But not all individuals infected with HBV develop CLD [7]. Only about 40% of chronic HBV patients would develop cirrhosis and cirrhosis related complications in their lifetime [8]. Approximately,15-25% of HBV- infected people die due to CLD [2]. HBV also can cause HCC in the absence of cirrhosis in a significant number of patients (11). The probability of developing CLD depends on the age of the individual at infection, which is inversely related to the risk of developing CLD [8]. Currently, there are different antiviral drugs for the treatment of HBV, but they are not curative. So, prevention of HBV is more important [9,10]. Unlike other sexually transmitted infections, HBV is vaccine-preventable [1].Vaccination against HBV before exposure is the main way of preventing HBV infection and its complication. Immunization is recommended for all medically stable infants weighing 2,000 gm and above, unvaccinated children, and unvaccinated adults requesting protection from HBV or who are at increased risk of infection [1,3]. Unfortunately, HBV vaccination has poor coverage even in high-risk groups, especially in low-income countries like Ethiopia [11,12]. And it was indicated as the main risk factor for high endemicity [13]. Despite the availability of HBV vaccines, the rate of HBV-related hospitalizations, cancers, and deaths in united states have been become more than doubling. In united states, CLD was one of the commonest causes of hospitalization and mortality [14]. World health organization estimates that the prevalence of HBV infection in Africa is, in average, more than 10%. Africa has the second-largest number of chronic carriers next to Asia [15]. Ethiopia is considered to have intermediate to high HBV infection rate [16]. Human immune deficiency virus (HIV) co-infection with HBV was a badly synergy and a public health problem, especially in Sub-Saharan countries [17,18].

Although studies done in some areas of Ethiopia showed the prevalence of HBV among CLD patients, associated factors for HBV infection were not studied. Besides, there is no similar study done at University of Gondar Comprehensive Specialized Hospital (UoGCSH) and in Amhara region at large. So, this study would help to fill the epidemiologic gap in the area. Moreover, the finding would provide information for health professionals and policy makers to plan interventional strategies. It could also serve as baseline information for those who seek to conduct similar studies with a better study design.

Therefore, the aim of this study was to determine seroprevalence of HBV and to identify its associated factors among CLD patients during the study period at UoGCSH.

2. Methods

2.1 Study Setting, Design, and Study Period

An institutional-based cross-sectional study was conducted at UoGCSH from May to September 2021. The hospital is located at the central Gondar zone of Amhara region, which is 750km Northwest of Addis Ababa, the capital city of Ethiopia. The hospital provides both healthcare service and teaching with different specialty for about 5 million people of both urban and rural communities of its catchment area.

2.2 Source and Study Population

All CLD patients of age 18 years and above at UoGCSH were the source population. CLD patients of age ≥18 years old who visited UoGCSH during the study period and fulfilled the inclusion criteria upon data collection were the study population.

2.3 Inclusion and Exclusion Criteria

All CLD patients of age 18 years and above at UoGCSH were eligible for this study. Those chronic liver disease patients of age 18 years and above who were very sick, could not give consent, and who were not willing to participate in the study were excluded from the study.

2.4 Sample Size Determination and Sampling Procedures

2.4.1 Sample Size Determination

Sample size was calculated using a single population proportion formula. Taking into account the 22.3% prevalence of HBV in Bereka medical center, Southeast Ethiopia [19]. The sample size was calculated with 95% certainty and a maximum discrepancy of 5% between the sample and the population. Additionally,10% was added to the sample size as a contingency for nonresponse.

$$n = \frac{(Z\alpha/_2)^2(p)(1-p)}{d^2} = \frac{(1.96)^2\,(0.223)(0.777)}{(0.05)^2} = 266$$

After taking 10% of non-response rate, 266+(266*10%) = **293**
The source population is <10,000. So, a finite sample size correction formula was applied.

$$n' = \frac{n}{\left[1+\frac{n-1}{N}\right]} = \frac{293}{\left[1+\frac{293-1}{1000}\right]}$$, Since, N =1000; the corrected study population was =**227**

Where;
N is the total population, n is determined sample size, n' is corrected (adjusted) sample size, p is prevalence of HBV in Bereka medical center (22.3%), Z is standard normal distribution corresponding to significance level at α=0.05, and d is the margin of error = 0.05

2.4.2 Sampling Procedure

A total of 227 study participants who visited UoGCSH during the study period were enrolled in this study using non-random convenient sampling technique until the required sample size was attained. Data was collected by face-to-face interview using a standardized, pre-tested questionnaire when patients come to outpatient department, emergency department, or regular follow-up or admitted to medical wards. Also, a detail clinical data was gathered by reviewing patients' medical record. The questionnaire includes sociodemographic characteristics (sex, age, address, marital status, occupation, and educational level), clinical factors (HBV infection, HCV infection, HIV infection, blood transfusion, hepatosplenic schistosomiasis (HSS), family history and contact to jaundiced patients, history of surgery and vaccination history for HBV), and behavioral factors (alcohol intake, cigarette smoking, tattooing, multiple sexual partners, chewing khat).

Laboratory test for HBsAg was done in UoGCSH main laboratory using a rapid test kit (Henso Medical (HANGZHOU) Co. LTD, China), following protocol of the manufacturer and standard of procedures. And hepatitis C virus antibody (Anti-HCV) was also done using rapid test kit (Guangzhou Wondfro Biotech co Ltd, China). Safety procedures and specimen handling procedures were strictly followed for the tests.

2.4.3 Study Variables

Prevalence of HBV was the dependent variables of this study, while socio-demographic characteristics: Age, sex, residency, marital status, educational level, occupation; Behavioral variables: Alcohol intake, Cigarette smoking, Chewing khat, Multiple sexual partners, tattooing; Clinical variables: Blood transfusion, contact to jaundiced patients, history of surgery, family history of liver disease, Vaccination for HBV, HSS; and Co-infections: HCV, HIV/AIDS were independent variables of the study.

3. Operational Definition

Hepatitis B virus Infection is considered when HBsAg is positive
Hepatitis C virus Infection: when a serology test for hepatis C antibody is positive
Alcohol Intake: Intake of any form and amount of alcohol
Significant Alcohol Intake: More than 20g/day in women and more than 40g/day for men; alcohol intake for ≥5 years [20].
Multiple Sexual Partner: Engaging in unsafe sexual activities with two or more people within a specific time period.
Contact to Jaundiced Patients: history of contact to blood of patients with liver disease
Cirrhosis; Ultrasound finding of hepatic parenchymal heterogeneity and surface irregularity
Hepatosplenic Schistosomiasis; Ultrasound diagnosis of hepatosplenic schistosomiasis with periportal and pericholecystic fibrosis and thickening with or without left liver lobe enlargement [21] .
Chronic Liver Disease : The presence of clinical features suggestive of liver disease (gastrointestinal bleeding, ascites, or hepatic encephalopathy) and/or ultrasound finding of liver parenchymal heterogeneity and/or surface irregularity.

4. Data Processing and Analysis

The data was coded manually and entered into epi-data version 4.6. The cleaned data was exported to SPSS version 26 to be analyzed. Descriptive statistics was used to determine the seroprevalence of HBV and to describe demographic characteristics of participants with HBV infection. A chi-square was used to assess the association between the outcome and independent variables. Bivariate logistic regression was done to identify factors associated with HBV infection. Multivariable logistic regression was employed at a 95% confidence interval to determine the impact of independent variables on the outcome variable. Those variables with a p value of <0.2 in bivariate logistic regression were included in the multivariate logistic regression analysis. The odds ratio was used to measure the strength of association, and a P value <0.05 was considered statistically significant. Model fitness was checked using Hosmer and Lemeshow, and the p value was 0.314.

5. Data Quality Assurance

To ensure data quality, training was given for all data collectors about the data collection procedures and its objective. HBsAg was determined at UoGCSH main laboratory using a rapid kit (Henso Medical (HANGZHOU) Co LTD, China) following the protocol of the manufacturer. The test kit has an accuracy of more than 99.5% and takes 10-15 minutes to read the result [22]. All the reagents were checked for expiry date, appropriate storage temperature, and humidity before use. Positive and negative controls were run together with each sample. A daily checkup of the collected data was done for completeness and consistency.

6. Results

6.1 Sociodemographic Characteristics of Participants

In this study, a total of 227 CLD patients were enrolled. The mean age of participants was 44.04 (±12.4). Most (84.6%) of the

participants were males, and females account 15.4%. About 169 (74.4%) of the participants were from rural area, and 77.6% of the participants were married. Regarding occupation of the study participants, most of them were farmers (63.4%), and about 47.6% can't read and write (Table 1).

Characteristics	Categories	Frequency	Percent (%)
Sex	Male	192	84.6
	Female	35	15.4
Age	18-24	10	4.4
	25-34	42	18.5
	35-44	73	32.2
	≥45	102	44.9
Residence	Urban	58	25.6
	Rural	169	74.4
Marital Status	Single	34	15.0
	Divorced	16	7.0
	Widowed	1	0.4
	Married	176	77.6
Occupation	Government employee	24	10.6
	Merchant	11	4.8
	Farmer	144	63.4
	Housewife	17	7.5
	Self employed	11	4.8
	Daily laborer	8	3.5
	Student	2	0.9
	Unemployed	10	4.4
Educational status	Unable to read and write	108	47.6
	able to read and write	30	13.2
	Primary education (Grade 1-8)	45	19.8
	Secondary school (Grade 9-10)	17	7.5
	Preparatory school (Grade 11-12)	2	0.9
	College and above	25	11.0

Table 1: Socio-Demographic Characteristics of Participants among Chronic Liver Disease Patients at UoGCSH, Northwest Ethiopia, 2021 (n=227)

6.2 Prevalence of Hepatitis B Virus

The prevalence of HBV among CLD patients at UoGCSH was 34.8% (95% CI 28.8-41) (Figure 1). A High rate of HBV Infection was Detected in those who were Married, and those in the age Group more than 44 years were more Infected (15%). It was also Found to be High in those Participants who were Farmers, live in rural Area, and Illiterate. An increased proportion of HBV was detected in males (AOR=4.0,95% CI=1.21-13.23, P=0.023) (Table 2). Among all participants of this study, 98 (43.2%) had multiple sexual partners and 43 (18.9%) had HCV co-infection, but only 13 (5.7%) had blood transfusion. A family history of liver disease was found in only 1.8% of the study participant. The prevalence of vaccination for HBV was only 7.5% among all the participants of the study (Table 3).

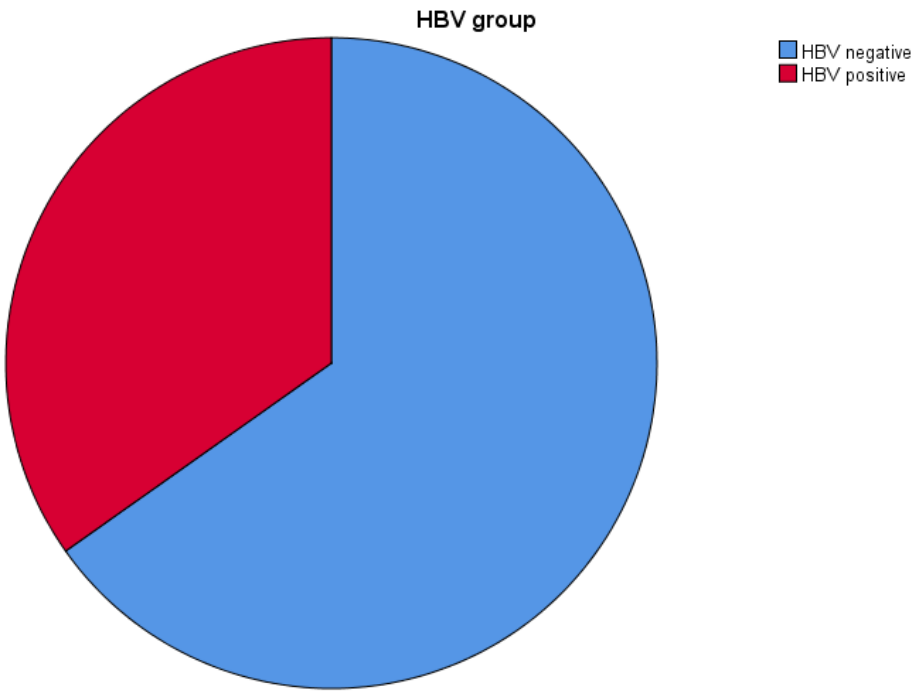

Figure 1: Prevalence of Hepatitis B virus among Chronic Liver Disease Patients at UoGCSH, Northwest, Ethiopia, 2021 (n=227)

Variables		HBsAg seroprevalence			
		Negative N (%)	Positive N (%)	COR (95% CI)	AOR (95% CI)
Sex	Male	120 (52.9)	72 (31.7)	2.4(0.99-5.77) *	4.0(1.21-13.23) **
	Female	28 (12.3)	7 (3.1)	1	
Age	18-24	8 (3.5)	2 (0.9)	0.5(0.1-2.5)	
	25-34	28 (12.3)	14 (6.2)	1.0(0.5-2.1)	
	35-44	44 (19.4)	29 (12.8)	1.3(0.7-2.5)	
	≥45	68 (30.0)	34 (15.0)	1	
Residence	Urban	34 (15.0)	24 (10.6)	1.56(0.8-2.7)	
	Rural	114 (50.2)	55 (24.2)	1	
Marital Status	Single	22 (9.7)	12 (5.3)	1.06(0.5-2.3)	
	Separated	1 (0.4)	1 (0.4)	1.95(0.12-31.72)	
	Divorced	10 (4.4%)	6 (2.6%)	1.17(0.4-3.37)	
	Widowed	0 (0.0)	1 (0.4)	NA	
	Married	115 (50.7)	59 (26.0)	1	
Occupation	Government employee	14 (6.2)	10 (4.4)	0.1(0.003-3.15)	
	Merchant	10 (4.4)	1 (0.4)	0.52(0.03-8.42)	
	Farmer	95 (41.9)	49 (21.6)	0.21(0.01-4.48)	
	Housewife	14 (6.2)	3 (1.3)	0.83(0.041-16.99)	
	Self employed	6 (2.6)	5 (2.2)	3.0 (0.12-73.64)	
	Daily laborer	2 (0.9)	6 (2.6)	0.71(0.04-12.83)	
	Student	1 (0.4)	1 (0.4)	1	
	Unemployed	6 (2.6)	4 (1.8)	0.67(0.03-14.03)	

Educational status	Unable to read and write	71 (31.3)	37 (16.3)	0.78(0.32-1.91)	
	able to read and write	22 (9.7)	8 (3.5)	0.54(0.18-1.7)	
	Primary education (Grade 1-8)	28 (12.3)	17 (7.5)	0.911(0.33-2.48)	
	Secondary school (Grade 9-10)	10 (4.4)	7 (3.1)	1.05(0.300-3.68)	
	Preparatory school (Grade 11-12)	2(0.9)	0(0.)	NA	
	College and above	15(6.6)	10(4.4)	1	

Key *=P-value <0.2 ** = P-value <0.05 ***= P-value <0.01

Table 2: Association of Socio-Demographic Characteristics with Hepatitis B virus Infection among Chronic Liver Disease Patients at UoGCSH, Northwest Ethiopia, 2021 (n=227)

6.3 Associated Factors for Hepatitis B Infection

Variables with P value less than 0.2 in the bivariate analysis: gender of participant, multiple sexual partners, contact to jaundiced patients, history of surgery, vaccination history for HBV, presence of HCV, and HSS were entered for further multivariate analysis. By adjusting potential confounders in multivariate logistic regression analysis, being male, having multiple sexual partners, contact to jaundiced patients, HSS, and HCV co-infection had statistically significant association with HBV infection. Males are four times more likely to have HBV infection as compared to females (Table 2). The odds of being positive for HBsAg is five times higher (AOR=5.4 95% CI=2.8-10.4, P value=0.001) among CLD patients who had history of multiple sexual partners as compared to those who had no history of multiple sexual partners. CLD patients who had HCV co-infection were three times (AOR=3.2,95% CI=1.35-7.57, P=0.008) more likely to be positive for HBsAg than those who had no HCV co-infection. Similarly, CLD patients who had contact to jaundiced patients were almost eleven times (AOR=10.9, 95% CI=1.8-66.91 P value =0.01) more likely to be HBsAg positive than those who had no history of contact to jaundiced patients. In contrast, CLD patients who had HSS were found to be 80% less likely to have HBV infection as compared to those who had no HSS (Table 3).

Variables		**HBsAg**			
		Negative N (%)	**Positive N (%)**	**COR (95% CI)**	**AOR (95%CI)**
Smoking Cigarette	Yes	6 (2.6)	5 (2.2)	1.60(0.47-5.41)	
	No	142 (62.6)	74 (32.6)	1	
Chew khat	Yes	4 (1.8)	3 (1.3)	0.70(0.15-3.23)	
	No	144 (63.4)	76 (33.5)	1	
Alcohol Intake	Yes	103 (45.4)	58 (25.6)	1.21(0.66-2.22)	
	No	45 (19.8)	21 (9.3)	1	
Significant Alcohol Intake	Yes	44 (27.3)	23 (14.3)	0.88(0.46-1.69)	
	No	59 (36.6)	35 (21.7)	1	
Tattooing	Yes	5 (2.2)	3 (1.3)	1.13(0.26-4.85)	
	No	143 (63.0)	76 (33.5)	1	
Blood transfusion	Yes	8 (3.5)	5 (2.2)	1.18(0.37-3.74)	
	No	140 (61.7)	74 (32.6)	1	
History of surgery	Yes	3 (1.3)	6 (2.6)	3.97(0.97-16.34)*	2.9(0.57-15.36)
	No	145 (63.9)	73 (32.2)	1	
Multiple sexual partner	Yes	41 (18.1)	57 (25.1)	6.76(3.68-12.44) *	5.4(2.8-10.4) ***
	No	107 (47.1)	22 (9.7)	1	
Contact to Jaundiced	Yes	2 (0.9)	7 (3.1)	7.1(1.44-35.03) *	10.9(1.8-66.91) **
	No	146 (64.3)	72 (31.7)	1	

Family history of Liver disease	Yes	0 (0.0)	4 (1.8)	NA	
	No	148 (65.2)	75 (33.0)	1	
Vaccination for HBV	Yes	14 (6.2)	3 (1.3)	1	
	No	134 (59.0)	76 (33.5)	2.65(0.74-9.50*)	2.7(0.61-11.96)
Stage of chronic liver disease	Yes	12 (5.3)	9 (4.0)	0.69(0.28-1.71)	
	No	136 (59.9)	70 (30.8)	1	
Hepatitis C virus	Positive	21 (9.2)	22 (9.7)	2.33(1.19-4.58) *	3.2(1.35-7.57) ***
	Negative	127 (55.9)	57 (25.1)	1	
HIV	Positive	4 (1.8)	3 (1.3)	1.4(0.3-6.59)	
	Negative	71 (31.3)	37 (16.3)	1	
	Unknown	73 (32.2)	39 (17.2)	0.97 (0.56-1.7)	
Hepatosplenic schistosomiasis	Yes	44 (19.4)	7 (3.1)	0.23 (0.1-0.54) *	0.2(0.08-0.53) ***
	No	104 (45.8)	72 (31.7)	1	

Model fitness with Hosmer Lemeshow test P=0.314

Key *=P value <0.2 ** = P value <0.05 ***= P value <0.01

Table 3: Bivariate and Multivariate Analysis of Clinical and Behavioral Factors of Hepatitis B Infection among Chronic Liver Disease Patients at UoGCSH, Northwest, Ethiopia, 2021 (n=227)

7. Discussion

Finding of this study revealed that the seroprevalence of HBV among CLD patients at UoGCSH was 34.8% (79/227). The seroprevalence of HBsAg was lower in this study as compared to a study in India, where the prevalence was 72.4%. This significant difference was due to the study population in India includes both patients with acute and chronic HBV infection [22]. But it was higher than a retrospective study done in Bereka medical center, Southeast Ethiopia (22.3%) [19]. The seroprevalence in this study was comparable with a study done in Harar, Easter Ethiopia, in 2018, among CLD patients, where the prevalence was 36.7% [21].

Even though a direct comparison was difficult due to difference in study population, the seroprevalence in this study was higher as compared to a previous study done in Tanzania (5.7%), which was done among health care workers. Unlike in the current study, the study conducted in Tanzania indicated that blood transfusion and hepatitis B vaccine were the only factors associated with HBV infection. This can be because most of the participants in the current study had no other comorbidities for blood transfusion, and majority (92.5%) of participants in the current study were not vaccinated, even though it was not statistically significant [23].

Being male sex, having multiple sexual partners, contact to jaundiced patients, HCV co-infection, and HSS were determinants of HBV among CLD patients. Regarding to the sociodemographic factors, males were more likely to be affected by HBV, and this is in agreement with study done in Slovakia [24]. This can be because males are more exposed for risks of HBV transmission due to their more outdoor activities. In this study, behavioral factors like alcohol consumption and tattooing and clinical factors like blood transfusion and history of surgery were not associated with HBV infection. This finding is in line with a study done in India [25]. In this study, the statistical association of contact with infected individuals with HBV infection is in agreement with a retrospective study done in Oman [26].

Although excessive alcohol intake is not associated with HBV infection in this study, a study done in China among participants selected from 2016 to 2019 indicated that excessive alcohol intake causes advanced cirrhosis of HBV and increased complications [20].

Similarly, the presence of concomitant HCV was three times more likely to be HBsAg positive as compared to those who had no HBV, and multiple sexual partners were significantly associated with HBsAg infection. These findings are in consistent with a cross-sectional study done in Hawassa among patients scheduled for surgery [27]. Cross-sectional studies done at eastern part of Ethiopia among medical students and medical waste handlers indicated that vaccination had an association with HBV infection. This finding doesn't agree with the finding in the current study; even though a high number of patients were unvaccinated, it was not statistically associated (2,25). At the same area a study conducted among CLD patients revealed that the prevalence of khat consumption was high (78%) which is in contrast to the finding in this study (3.1%). This significant difference is due to the increased habit of consuming khat at eastern Ethiopia at the population level. But the prevalence of HSS in the current study was higher than the same study done in Harar. This is because there are endemic areas of schistosomiasis in the catchment area of the hospital [21].

A cross-sectional study design was used in this study, and it is one limitation of this study as it didn't show cause-effect relationship. The other limitation of the study is that it was done in one center. Additionally, determining polymerase chain reaction (PCR) for HCV and HIV test for all participants was not possible due to lack of budget.

8. Conclusion

The prevalence of HBV infection among adult CLD patients at UoGCSH was high. Being male gender, multiple sexual partners, contact to jaundiced patients, and HCV co-infection were found to be the predominant factors associated with HBV infection in CLD patients. Therefore, Proper health education and media campaign should be conducted with the general population to inform them about the risk factors of HBV infection and its routes of transmission. Counseling of CLD patients and screening of family members for HBV should be done to prevent transmission. Further multicenter detail studies of high-risk behavior with an increased sample size and a better study design would provide an alarming awareness of their association.

9. Declarations

Ethical approval and consent to participant:

Ethical approval was obtained from institutional review board (IRB) of the university of Gondar with a reference number 585/05/2021. The study was conducted in accordance with the ethical principles of the declaration of Helsinki on human subjects. Informed consent was taken from each study subject after a detailed information was provided about the purpose and procedure of the of study. All the information gathered from them was kept confidential by using codes rather than any personal identifiers and was only used for research purposes. Participation was fully voluntary. All the ethical standards were followed.

Consent for publication: not applicable

Availability of Data and Materials:

All data generated and analyzed during this study were included in this article. The data that supports the findings of this study is also available from the corresponding author on reasonable request.

Competing Interests: All authors declare that there is no conflict of interest with respect to the authorship and/or publication of this research paper

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Authors' Contributions: DA: Contributed to the conceptualization of the research idea, study design, data collection, data analysis, interpretation, and write up of the research;
ZA, TT, and EA: Contributed to the supervision of the research work and review of the manuscript; and AD: Contributed to the data review, editing, interpretation, and writing up of the manuscript. All authors read and approved the final manuscript.

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