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# Hepatitis B Prevalence and Risk Factors in Chronic Liver Disease Patients at Hawassa University Comprehensive Specialized Hospital, Sidama Region, Ethiopia

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**Abstract:** *Background:* Chronic liver disease (CLD) is a progressive deterioration of liver functions for more than six months, which includes the synthesis of clotting factors, and other proteins, detoxification of harmful products of metabolism, and excretion of bile. Viral hepatitis is one of the main causes of CLD. *Objective:* The main objective of this study is to determine the prevalence and associated risk factors of hepatitis B infection among patients visiting the medical referral clinic at Hawassa University Comprehensive Specialized Hospital, Sidama region, Ethiopia. *Methods:* A cross-sectional study was conducted on patients attending a medical referral clinic at Hawassa University Comprehensive Specialized Hospital, Sidama region, Ethiopia during the study period from October 2019 to August 2021 by reviewing the medical cards of 329 patients. The collected data was analyzed by data software and outcomes are presented by tables, figures, and statements. *Result:* A total of 195 adult patients with a sign and symptoms of CLD were included in this study. Of these 143 (73.3%) male and 52 (26.7%) female participated in the study. The mean age of the participant was 33.5 years (SD ±12) most of the patients were in the 26-35 age range. The majority 57% of the study participants were rural residents. Considering marital status 66.7% of the study participants were married. The most common cause of chronic liver disease is caused by chronic HBV (79.5%) followed by Hepatosplenic Schistosomiasis (5.6%) with positive HBsAg 0% and 3% respectively. Among 195 chronic liver disease patients, 143 (73.3%) were male and 21 (62.1%) were positive for HBsAg which were statistically significant with (COR 2.9 and 95% CI 1.4-6.). Of those who were Child-Pugh Class A (113) were positive for HBsAg 103 (52.8) (COR, 5.5; 95% CI, 2.2–14; P-Value 0.0001) and compensated patient where (COR, 8; 95% CI, 3.5–19; P-Value 0.0001) for which both are statically significant. Risk factors associated with HBV among chronic liver disease the following were significantly associated with hospital admission (COR, 53.4; 95% CI, 1.5–8; P-Value 0.002) and blood transfusion (COR, 0.22; 95% CI, 0.1–0.5; P-Value 0.0001). *Conclusions:* The present study has shown that HBV (79.5%) was highly prevalent among patients with chronic liver disease. Screening all possible close contacts (relatives) of patients with HBV and giving immunization to this group and if possible giving public immunization of HBV is recommended to halt HBV infection. Most patients in this study group are compensated 57.4% and Child Class A 59.5% which gives time to implement treatment to decrease disease progression to the

worsen. and this study will give insight into availing appropriate medication for treatment

**Keywords:** Hepatitis B, Chronic Liver Disease, Viral Hepatitis, Hawassa University Comprehensive Specialized Hospital, Liver Failure

# 1. Introduction

Liver functions for more than six months, which includes the synthesis of clotting factors, and other proteins, detoxification of harmful products of metabolism, and excretion of bile. CLD is a continuous process of inflammation, destruction, and regeneration of liver parenchyma, which leads to fibrosis and cirrhosis. The spectrum of etiologies is broad for chronic liver disease, which includes toxins, alcohol abuse for a prolonged time, infection, autoimmune diseases, and genetic and metabolic disorders. Cirrhosis is the final stage of chronic liver disease that results in the disruption of liver architecture, the formation of widespread nodules, vascular reorganization, neo-angiogenesis, and deposition of an extracellular matrix [1].

The most common causes of chronic liver disease, in general order of frequency, are chronic hepatitis C, alcoholic liver disease, nonalcoholic steatohepatitis, chronic hepatitis B, autoimmune hepatitis, sclerosing cholangitis, primary biliary cholangitis, hemochromatosis, and Wilson disease [2].

Hepatitis is a term which refers to the inflammation of the liver. It occurs as a result of infection with various pathogens, exposure to alcohol; medications, chemicals, poisons, as well as immune disorders. Hepatitis viruses are a diverse group of medically important viruses which affect millions globally. To date, the following hepatitis viruses are known: hepatitis A, B, C, D, E, F, and G [3].

The presence of Hepatitis B Surface Antigen (HBsAg) establishes the diagnosis of hepatitis B. Chronic versus acute infection is defined by the presence of HBsAg for at least 6 months. The prevalence of HBsAg varies greatly across countries, with a high prevalence of HBsAg-positive persons defined as ≥8%, intermediate as 2% to 7%, and low as <2%. Hepatitis B virus (HBV) is transmitted by perinatal, percutaneous, and sexual exposure and by close person-to-person contact which is presumed to be by open cuts and sores, especially among children in hyperendemic areas [4-6].

WHO estimates that in 2015, viral hepatitis was responsible for 1.34 million deaths. This number was comparable with the number of deaths from tuberculosis but higher than the number of deaths from HIV [7]. The organization also estimates that in 2015, 257 million persons, or 3.5% of the population, were living with chronic HBV infection in the world. The mortality rate from viral hepatitis (18.3 per 100 000 globally) is highest in the Western Pacific Region (24.1 deaths per 100 000), followed by the Southeast Asia Region (21.2 per 100 000) and African Region (13.7 per 100 000), and lowest in the American Region (11.2 per 100 000). Worldwide, the Western Pacific, Southeast Asia, and African regions account for 446,000, 408 000, and 136,000 deaths, respectively (33%, 30%, and 10% of the total deaths, respectively). Mortality from viral hepatitis has increased by 22% since 2000. Unless people with HBV and HCV infection are diagnosed and treated, the number of deaths due to viral hepatitis will continue to increase [7].

The prevalence of HBV is highest in sub-Saharan Africa and East Asia. Most people living in these regions become infected during childhood, and up to 5-10% of the adult population is chronically infected. HBV accounts for over 80% of adult patients with sporadic hepatitis in sub-Saharan Africa [8].

Many researchers have investigated prevalence rates of HBV infections in various groups (blood donors, pregnant, admitted patients, and others), however, the studies conducted in Ethiopia on patients with chronic liver disease are limited to a few studies.

The magnitude of hepatitis B infection in CLD patients and its associated factors is not well known in most of Ethiopia so this study aimed to give us an insight and will be used as a benchmark study. It will also help the policymaker and other responsible bodies to plan necessary training programs for health professionals which will help them to improve their knowledge and catch the attention of this responsible body to focus on preventive strategy, early screening, and treatment.

# 2. Objectives

### *2.1. General Objectives*

To determine the prevalence and associated risk factors of hepatitis B infection among patients visiting medical referral clinics at Hawassa University Comprehensive Specialized Hospital Sidama Region, Ethiopia.

### *2.2. Specific Objective*

1. To determine the HBV seroprevalence among patients visiting the medical referral clinic
2. To determine factors associated risk factor of hepatitis b infection among patients visiting the medical referral clinic at Hawassa Comprehensive Referral Hospital.

# 3. Methods

### *3.1. Study Area*

This study was conducted at Hawassa University Comprehensive Specialized Hospital (HUCSH), which is one of the tertiary and teaching hospitals in the southern region, of Hawassa town. Hawassa is located 270 km to the southeast of the capital city of Ethiopia, Addis Ababa. HU-CSH is the first referral hospital established in the region serving as a teaching

hospital for the College of Medicine and Health Science of Hawassa University, with a catchment population of 10-12 million. It serves about 43,384 patients of all types per year. The hospital has seven departments. This study was conducted on patients visiting medical referral clinics.

### *3.2. Study Design and Period*

A cross-sectional study was conducted among patients who visited Hawassa University Comprehensive Specialized Hospital medical referral clinic from October 2019 to August 2021.

### *3.3. Source Population*

*Study Population*

Patients who visited the medical referral clinic during the data collection period and who fulfilled the inclusion criteria.

### *3.4. Inclusion and Exclusion Criteria*

#### *3.4.1. Inclusion Criteria*

Patients who visited the gastroenterology clinic during the data collection period.

#### *3.4.2. Exclusion Criteria*

All those with incomplete chart records.

### *3.5. Sample Size and Sampling Technique*

The sample size was calculated based on a single population formula by considering a 5% margin of error, 95% CI. Ethiopian studies show the prevalence of HBV among CLD is 35.8%.

$$N=Z^2 P (1-P)/W^2$$

where N = sample size

$N=1.96^2 \times 0.0358(1-0.0358)/ 0.05^2$

N= 355

Since the study population is less than 10,000, n =350 needs to be corrected

Nf= N/1+ (N-1)/n where nf-is corrected sample size

Assuming a 10% non-response rate: the final sample size = 195.

### *3.6. Study Variables*

#### *3.6.1. Dependent Variables*

Chronic liver disease

#### *3.6.2. Independent Variables*

*Sociodemographic data*

1) Age
2) Sex
3) Religion
4) Occupation
5) Level of education
6) Marital status
7) Ethnicity
8) Residency

*Comorbidities*

HIV, STI, DM, CLD, CKD, HTN

*Risk factors for HBV infection*

1) Blood transfusion history
2) History of surgical procedure
3) History of hospital admission
4) Contact with jaundiced patients/Liver disease
5) History of Dental procedure
6) History of Tattooing
7) History of Sharing Sharp Objects
8) Multiple sexual partners
9) Vaccination states
10) Illicit drug use with unsafe injection

### *3.7. Data Collection and Analysis*

Data was collected using structured questionnaires composed of sociodemographic data and lab results from the chart of the patient. Pre-testing of the questionnaire was done in 5% (13) of the sample size at a private hospital in Hawassa.

Data was checked at the end of each day for completeness and consistency. It was also cleaned, edited, coded, and entered into Epi data version 6, software. Then it was exported to SPSS of version 20 for analysis The results were illustrated in the form of frequency tables; pie charts and graphs to give a glance at the variables. Descriptive statistics like frequencies, proportions, and summary statistics were used to describe the First bivariate relationship between each independent variable and outcome variable was investigated using binary regression analysis. The variables that showed a significant association on bivariate analysis with a p-value of $<0.05$ were used for binary logistic regression. Multivariable logistic regression analyses were used to minimize the effect of confounding variables and to identify the major risk factors of hepatitis B. An adjusted odds ratio with a 95% confidence interval was used to assess the strength of the association.

### *3.8. Data Quality Assurance and Management*

Before data collection discussion was conducted with the data collector about what important information would be taken. How to collect? During data collection, the principal investigator checked the completeness, and ambiguous suspicions on the spot. Before feeding the information into the computer, it was checked for completeness and accuracy; then it was fed into the computer and analyzed and interpreted.

### *3.9. Ethical Consideration*

Ethical clearance and waiver of consent were obtained from the Institutional Review Board of Hawassa University's specialized comprehensive hospital. All information obtained from the record was kept anonymous.

### *3.10. Dissemination of the Result*

The findings of this result will be disseminated through publications (local or international journals) or presentations at conferences. A copy of it was offered to HUCSH, the Department of Internal Medicine, and other concerned bodies

so that they can use the results for planning and implementation of strategies to improve the quality of care.

### *3.11. Definition and Operational Terms*

*CLD*: chronic liver disease was based on history, clinical, ultrasound, and impaired liver function tests.

*Decompensated*: is with one or more of the following characterizes variceal hemorrhage, ascites, encephalopathy, Jaundice and hepatocellular carcinoma.

*Compensated*: is where, these complications are absent variceal hemorrhage, ascites, encephalopathy, Jaundice and hepatocellular carcinoma.

*Delivery by TBA*: when the delivery is conducted by an untrained person out of a health facility.

*Illicit drug use*: use of parenteral and recreational drugs with unsafe injection.

*Unsafe injection*: when the injection is given with an unsterilized syringe including reuse of the needle.

*Abortion*: termination of pregnancy before 20 weeks outside a health facility with or without health professionals.

*Shaving*: when someone shares sharp material for shaving.

*Multiple sexual partners*: having sexual intercourse with more than one sexual partner.

*STI*: if a person has a sexually transmitted infection including a previous history.

## 4. Result

### *4.1. Sociodemographic Characteristics*

A total of 195 adult patients with a sign and symptoms of CLD were included in this study. Of these 143 (73.3%) male and 52 (26.7%) female participated in the study. The mean age of the participant was 33.5 years (SD ±12) most of the patients were in the 26-35 age range. The majority 57% of the study participants were rural residents. Considering marital status 66.7% of the study participants were married. (Table 1)

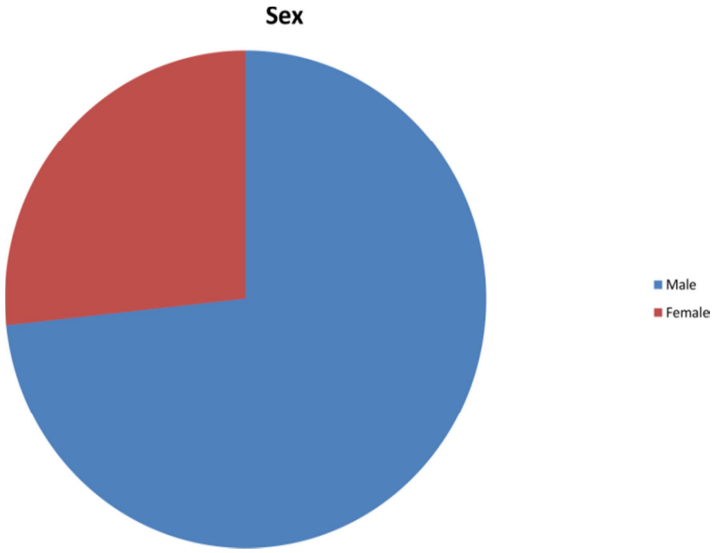


***Figure 1.*** *Frequency of sex in CLD patients in study area & period.*

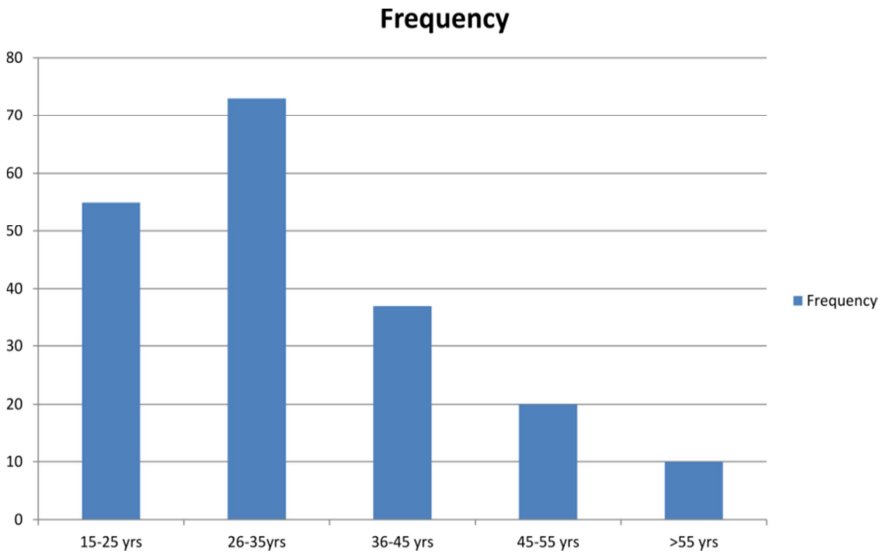


***Figure 2.*** *Frequency of age in CLD patients in the study area & period.*

***Table 1.*** *Socio-demographic characteristics of HBV infection among patients with chronic liver disease.*

| Variable | | Frequency | Percent (%) |
|---|---|---|---|
| Sex | Female | 52 | 26.7 |
| | Male | 143 | 73.3 |
| Age in Years | (mean ±SD) | 33.5(12) | - |
| | 15-25 | 55 | 28.2 |
| | 26-35 | 73 | 37.4 |
| | 36-45 | 37 | 19.0 |
| | 45-55 | 20 | 10.3 |
| | >55 | 10 | 5.1 |
| Martial Status | Single | 56 | 28.7 |
| | Married | 130 | 66.7 |
| | Divorced | 4 | 2.1 |
| | Widowed | 5 | 2.6 |
| Residence | Urban | 111 | 57 |
| | Rural | 84 | 43 |
| Region | Oromia | 84 | 43.1 |
| | Sidama | 73 | 37.4 |
| | SNNPR | 36 | 18.5 |
| | Somali | 2 | 1.0 |

### *4.2. Cause and Stages of Liver Injury in Relation to HBsAg Result*

The most common cause of chronic liver disease is caused by chronic HBV (79.5%) followed by Hepatosplenic Schistosomiasis (5.6%) with positive HBsAg 0% and 3% respectively.

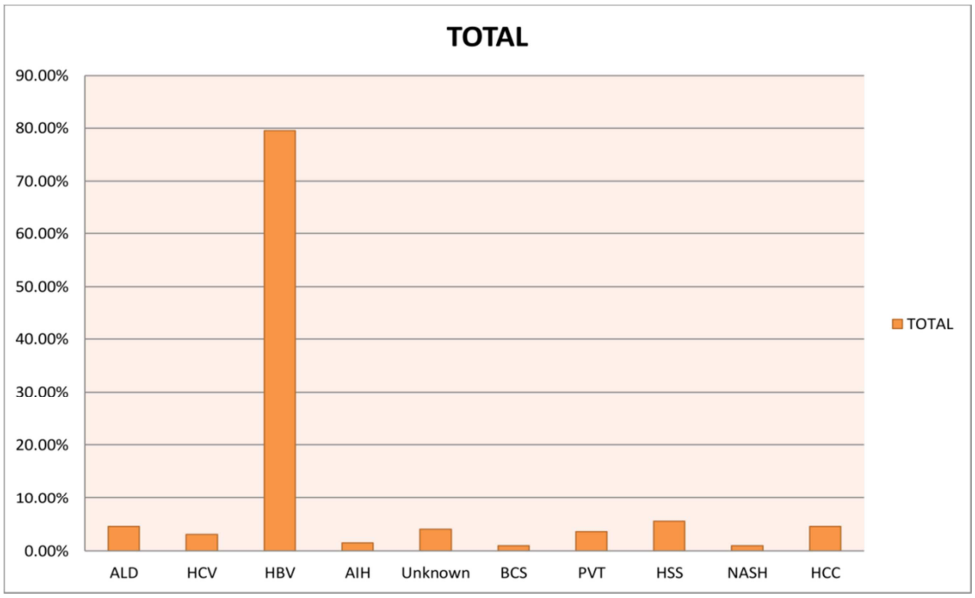


***Figure 3.*** *Causes of chronic liver disease Alcoholic Liver Disease (ALD), Chronic HCV.*

***Table 2.*** *Causes of Chronic Liver Disease and HBsAg Result.*

| Causes of Chronic Liver Disease | Negative | Positive | Total No (%) |
|---|---|---|---|
| | No (%) | No (%) | |
| Alcoholic Liver Disease(ALD) | 9 (4.6) | 0 | 9 (4.6) |
| Chronic HCV | 5 (2.6) | 1 (0.5) | 6 (3.1) |
| Chronic HBV | 0 | 155 (79.5) | 155 (79.5) |
| Autoimmune Hepatitis(AIH) | 3 (1.5) | 0 | 3 (1.5) |
| Unknown Cause | 8 (4.1) | 0 | 8 (4.1) |
| Buddchari Syndrome(BCS) | 1 (0.5) | 1 (0.5) | 2 (1) |
| Portal Vein Thrombosis(PVT) | 5 (2.6) | 2 (1) | 7 (3.6) |
| Hepatosplenic Schistosomiasis(HSS) | 8 (4.1) | 3 (1.5) | 11 (5.6) |
| Non Alcoholic Steatohepatitis(NASH) | 1 (0.5) | 1 (0.5) | 2 (1) |
| Hepatocellular carcinoma (HCC) | 1 (0.5) | 8 (4.1) | 9 (4.6) |

### *4.3. Factors Associated with HBsAg Among Patients with Chronic Liver Disease*

Both bivariate and multivariable analyses were used to assess the association of independent factors with the prevalence of HBsAg among patients with chronic liver disease.

Among 195 chronic liver disease patients, 143 (73.3%) were male and 21 (62.1%) were positive for HBsAg which were statistically significant with (COR 2.9 and 95% CI 1.4-6.). Of those who were Child-Pugh Class A (113) were positive for HBsAg 103(52.8) (COR, 5.5; 95% CI, 2.2–14; P-Value 0.0001) and compensated patient where (COR, 8; 95% CI, 3.5–19; P-Value 0.0001) for which both are statically significant.

Risk factors associated with HBV among chronic liver disease the following were significantly associated with hospital admission (COR, 53.4; 95% CI, 1.5–8; P-Value

0.002) and blood transfusion (COR, 0.22; 95% CI, 0.1–0.5; P-Value 0.0001). Table 3

In multivariate analysis of selected variables for independent predictors of HBV in chronic liver disease male (aOR, 2.6; 95% CI, 0.96–7; P-Value 0.06) which is not statically significant; Child-Pugh class A (AOR, 0.33; 95% CI, 0.5–2; P-Value 0.24); Child-Pugh class B were (AOR, 3; 95% CI, 1-9; P-Value 0.047); Hospital Admission history (AOR, 0.6; 95% CI, 0.2-2; P-Value 0.403) and history of blood transfusion (AOR, 1; 95% CI, 0.3-3.5; P-Value 0.97).

***Table 3.*** *Status of Liver Injury and Associate Risk Factors of HBV.*

| Parameters | | Negative | Positive | Total | COR | P-value | AOR | P-Value |
|---|---|---|---|---|---|---|---|---|
| | | No (%) | No (%) | No (%) | (95% CI) | | (95% CI) | |
| Gender | Female | 18 (9.2) | 34 (17.4) | 52 (26.7) | 1.00 | | 1.00 | |
| | Male | 22 (11.3) | 121 (62.1) | 143 (73.3) | 2.9 (1.4-6) | 0.004 | 2.6 (0.96-7) | 0.06 |
| Child-Pugh Class | Class A | 13 (6.7) | 103 (52.8) | 116 (59.5) | 5.5 (2.2-14) | 0.0001 | 0.33 (0.5-2) | 0.24 |
| | Class B | 13 (6.7) | 32 (16.4) | 45 (23.1) | 1.7 (0.6-4.4) | 0.25 | 3 (1-9) | 0.047 |
| | Class C | 14 (7.2) | 20 (10.3) | 10.3 (17.4) | 1.00 | | 1.00 | |
| Liver Injury | Compensated | 8 (4.1) | 104 (53.3 | 112 (57.4) | 8 (3.5-19) | 0.0001 | 58 (8-432) | 0.0001 |
| | Decompensated | 32 (16.4) | 51 (26.2) | 83 (42.6) | 1.00 | | 1.00 | |
| Community Associated Risk Factor | | | | | | | | |
| Nose or ear or Traditional body piercing | No | 22 (14.2) | 107 (69) | 129 (83.2) | 1.00 | | 1.00 | |
| | Yes | 3 (1.9) | 23 (14.8) | 26 (16.8) | 1.6 (0.43-6) | 0.48 | | |
| Tattooing on the body or gum | No | 20 (12.7) | 105 (66.9) | 125 (79.6) | 1.00 | | 1.00 | |
| | Yes | 6 (3.8) | 26 (16.6) | 32 (20.4) | 0.8 (0.3-6) | 0.79 | | |
| Dental extraction at home | No | 21 (14.5) | 114 (78.6) | 135 (93.1) | 1.00 | | 1.00 | |
| | Yes | 2 (1.4) | 8 (5.5) | 10 (6.9) | 0.73 (0.14-4) | 0.711 | | |
| Share Shaving instrument | No | 24 (15.5) | 124 (80) | 148 (95.5) | 1.00 | | 1.00 | |
| | Yes | 1 (0.6) | 6 (3.9) | 7 (4.5) | 1.1 (0.34-10) | 0.89 | | |
| Contact with jaundiced patient | No | 20 (11.6) | 98 (56.6) | 118 (68.2) | 1.00 | | 1.00 | |
| | Yes | 11 (6.4) | 44 (25.4) | 55 (31.8) | 0.8 (0.36-1.8) | 0.6 | | |
| Hospital Associated Risk Factor | | | | | | | | |
| Hospital Admission | No | 14 (7.9) | 106 (59.9) | 120 (67.8) | 1.00 | | 1.00 | |
| | Yes | 18 (10.2) | 39 (22) | 57 (32.2) | 3.4 (1.5-8) | 0.002 | 0.6 (0.2-2) | 0.403 |
| Surgical Procedure | No | 32 (20.5) | 120 (76.9) | 152 (97.4) | 1.00 | | 1.00 | |
| | Yes | 0 (0) | 4 (2.6) | 4 (2.6) | 4307 (0-1) | 1 | | |
| Blood Transfusion | No | 15 (8.9) | 108 (64.3) | 123 (73.2) | 1.00 | | 1.00 | |
| | Yes | 17 (10.1) | 28 (16.7) | 45 (26.8) | 0.22 (0.1-0.5) | 0.0001 | 1 (0.3-3.5) | 0.97 |
| Ever Smoker | No | 34 (18.9) | 140 (77.8) | 174 (96.7) | 1.00 | | 1.00 | |
| | Yes | 5 (2.8) | 1 (0.6) | 6 (3.3) | 0.29 (0.37-2.3) | 0.24 | | |
| Alcohol | No | 29 (15.8) | 131 (71.6) | 160 (87.4) | 1.00 | | 1.00 | |
| | Yes | 11 (6) | 12 (6.6) | 23 (12.6) | 0 | | 1 | |

# 5. Discussion

In this study, the prevalence of HBV in chronic liver disease where 79.5% which is higher than in a similar study done in Public Hospitals in Addis Ababa Ethiopia Hepatitis B surface antigen was detected in 35.8% [17].; another study done in northern India infection was detected in 60.6% [18]. and Pakistani 55% were positive for hepatitis B surface antigen [19].

Among 195 chronic liver disease patients, 143(73.3%) were male and 21(62.1%) were positive for HBsAg which were statistically significant with (COR 2.9 and 95% CI 1.4-6.) and males were more likely to be affected by HBV than the counterpart female 52 (26.7%) and are statically significant(p-0.004) this result goes in line with a study done in Ethiopia where prevalence was higher in males 38.2% than females 31.8% but the difference was not statistically significant (cOR = 1.322; 95% CI: 0.603–2.900; p-0.556) (28) this goes in line with a study conducted in northern India where male and female 79% and 21%were included in the study [18]. Although direct comparison is difficult because of the difference in the study population, in a study done in Hawassa Ethiopia among patients scheduled for surgery 51.2% were males and 48.8% were females [15].

Age distribution of CLD patients in this study showed that 95% of the study population was below 55 and between 26-35 years of age which is higher even though the cut of age in this study was 55 years and 50 years in the study done in Addis Ababa Ethiopia was 75.8% of CLD cases were below 50 years of age [17].

The most common cause of chronic liver disease in this study in order of frequency where HBV Hepatosplenic SchistosomiasisAlcoholic Liver DiseasePortal Vein Thrombosis and HCV which goes in line with a study done in India where Alcoholism (34.3% of 4413) was the commonest cause of cirrhosis while Hepatitis B (33.3%) was the predominant cause of chronic liver disease in general and non-cirrhotic chronic liver disease (40. 8% out of 8163) unlike a study done on The global, regional, and national burden of cirrhosis by cause in 195 countries. The most common causes of prevalent disease are (59%) non-alcoholic fatty liver disease (NAFLD), followed by (29%) HBV, (9%) HCV, and (2%) alcoholic liver disease (ALD) [13].

A multivariate analysis done in Hawassa Ethiopia shows multiple sexual partners (AOR = 2.58, CI 1.18–5.61), dental procedures (AOR = 4.20, CI 1.87–9.55) and blood transfusion (AOR = 3.84, CI 1.27–11.65) were significant factors associated with HBV infection [15]. Unlike this study which shows only Hospital Admission history (AOR, 0.6; 95% CI, 0.2-2; P-Value 0.403) after adjusting for confounding.

# 6. Strength and Limitations

### *6.1. Strength of the Study*

One main strength of this study is its comprehensive approach to understanding the prevalence and risk factors of hepatitis B infection among patients with chronic liver disease. The study not only investigates the prevalence of the disease but also delves into the associated risk factors, providing a holistic view of the issue.

Additionally, the study's use of a relatively large sample size (195 patients) enhances the reliability of its findings.

### *6.2. Limitation*

As it is a secondary data analysis important information was missed and were only able to find limited factors.

Being a hospital-based study it is difficult to generalize the result on a community level.

# 7. Conclusion and Recommendation

The present study has shown that HBV (79.5%) was highly prevalent among patients with chronic liver disease. Screening all possible close contacts (relatives) of patients with HBV and giving immunization to this group and if possible giving public immunization of HBV is recommended to halt HBV infection.

Most patients in this study group are compensated 57.4% and Child Class A 59.5% which gives time to implement treatment to decrease disease progression to the worsen. and this study will give insight into availing appropriate medication for treatment.

# Acronyms and Abbreviations

ALD: Alcoholic liver disease

Anti: HBc IgG–Antibody for Hepatitis B Core immunoglobulin G

Anti: HBc IgM–Antibody for Hepatitis B Core immunoglobulin M

CHB: Chronic Hepatitis B

CKD: Chronic Kidney Disease

CLD: Chronic Liver Disease

HBcAb: Hepatitis B Core Antibody

HBeAg: Hepatitis B Pre-Core Antigen

HBeAb: Hepatitis B Pre-Core Antibody

HBsAg: Hepatitis B Surface Antigen

HBV: Hepatitis B Virus

HCC: Hepatocellular Carcinoma

HCV: Hepatitis C Virus

HIV: Human Immunodeficiency Virus

HUCSH: Hawassa University Comprehensive Specialized Hospital.

LT: Liver Transplantation

NAFLD: Non-Alcoholic Fatty Liver Disease

STI: Sexually Transmitted Disease

WHO: World Health Organization

# Authors' Contribution

Conceptualization, B. L, and R. H.; methodology, S. S, and D. K.; software, R. H, and L. A.; validation, L. A., T. H., and D. K.; formal analysis T. H and B. L.; investigation, L. A, and T. H.; resources, B. L and R. A.; data curation, R. A, and S. S.; writing—R. H and B. G.; writing—review and editing, B. G and B. L.; visualization, L. A.; supervision S. S and T. H.; project administration, B. L, and R. H.; funding acquisition R. A and D. K.

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# Conflicts of Interests

The authors declare no conflicts of interest.

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