

Trend Analysis of Hepatitis B and C Virus Infections Among Patients at Ambo General Hospital, West Shoa, Ethiopia: Retrospective Study

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ABSTRACT

Background: Hepatitis B and C viruses affect the liver and can cause a wider range of disease outcomes. Chronic HBV and/or HCV infection leaves a person susceptible to major liver diseases, such as liver cirrhosis or hepatocellular cancer, later in life. They bear the greater portion of the mortality and morbidity associated with hepatocellular carcinomas and liver cirrhosis.

Methods: A retrospective laboratory record review was conducted at Ambo General Hospital from January 2018 to December 2021. The retrieved data included the date of examination, age, sex, and laboratory results of the HBV and HCV. Data were summarized and presented in the form of tables, figures, and frequencies to present the results. The data were analyzed using SPSS and Microsoft Excel.

Results: Over 4 years, a total of 5675 individuals were examined for hepatitis at Ambo General Hospital. Of the total individuals examined, 365(6.4%) and 15(2.1%) were positive for HBV and HCV, respectively. HBV and HCV mixed infections accounted for 0.6% of the cases. HBV was more prevalent in males (12.1%) than in females (5.72%), while among seropositive individuals of HCV, 7(5.7%) were males and 4(1.0%) were females. HBV and HCV were more prevalent among individuals aged 45-54 years old, 11(11.6%) and 35-44 years old, 4(5.6%), respectively. A high percentage of HBV (7.1%) and HCV (5.5%) were seen in the years of 2018 and 2020, respectively.

Conclusion: According to WHO criteria, the total prevalence of hepatitis B and C in our study is moderate, and the prevalence of HBV is significantly higher than that of HCV. Although there are annual fluctuations in the prevalence. As a result, it is critical to improve coverage of services in healthcare facilities and raise community awareness regarding the means of transmission, prevention, and control of hepatitis B and C virus infection.

Keywords: Hepatitis B virus, Hepatitis C virus, Patient, West Shoa, Ethiopia

Introduction

Hepatitis is an inflammation of the liver that can be caused by infectious and non-infectious agents such as viruses, bacteria, fungi, parasites, alcohol, drugs, self-immune diseases, and metabolic diseases. The significant causes of hepatitis are viruses, such as hepatitis A, B, C, D, and E. The most frequent causes of viral hepatitis among them are the hepatitis B virus (HBV) and the hepatitis C virus (HCV). Both HBV and HCV infections are extremely contagious and can spread vertically, through sexual contact, and through blood transfusions [1].

Viral hepatitis is a serious health problem globally and causes acute and chronic hepatitis, which can result in liver damage (cirrhosis), liver failure, liver cancer, and even death. Viral hepatitis causes over 1.4 million deaths annually, with HBV and HCV accounting for roughly 96% of these cases. There were 257 and 10 million HBV and HCV infections worldwide, respectively. Of these, 80 million have active viremia infections. If left untreated, up to 30% of chronic HBV and 20% of chronic HCV cases develop liver cirrhosis and hepatocellular carcinoma, which are the sixth most common cancer and the third cause of cancer-associated deaths worldwide. The prevalence of HBV infection varied from high ($\geq 8\%$) to intermediate (2-7%) and low (3.5%), moderate (1.5-3.5%), and low ($< 2\%$). Likewise, HCV infection is high ($> 3.5\%$), moderate (1.5-3.5%), and low

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(<1.5%) prevalence according to the World Health Organization (WHO) [2-6].

While the prevalence of HBV and HCV infection is distributed globally, the great majority of those who are affected live in low- and middle-income nations. In Africa, the prevalence of HBV is 6.1%, with about 87,890 deaths annually. However, the Sero-prevalence differs depending on sex, ethnicity, and rural residence [3,4,7].

In Ethiopia, there are various studies have indicated the trends of HBV and HCV in different areas. They showed that viral hepatitis remains a public health problem. A systematic review and meta-analysis clinical study showed that liver disease accounted for 12% of hospital admissions and 3% of hospital mortality due to HBV and HCV infections [8]. In the study area, no adequate data indicate the progress of HBV and HCV infections. Therefore, this study aimed to determine the trend of Hepatitis B and C virus infections among patients who have been tested at Ambo General Hospital from 2018-2021.

Materials and Methods

Study Design and Setting

A facility-based retrospective study was conducted from April to July 2022 among patients who had been tested for hepatitis B and C viruses at Ambo General Hospital from January 2018 to December 2021 in Ambo town, Ethiopia (Figure 1). Based on the census of 2021, the population of Ambo city is 64684 people. There are two public hospitals in Ambo city: Ambo University Referral Hospital and Ambo General Hospital.

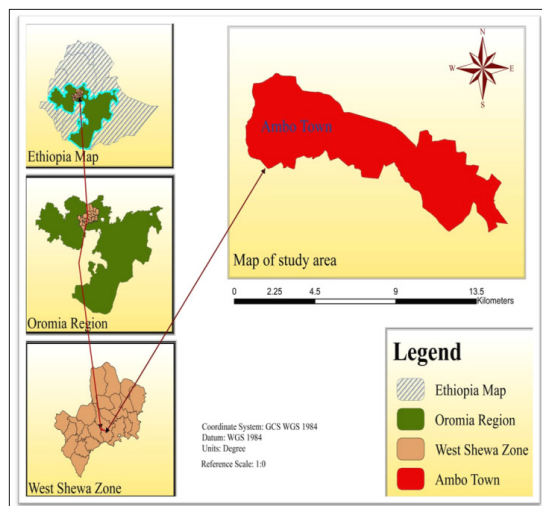


Figure 1: Map of the study area

Source and Study Population

All patients suspected of having HBV and HCV at Ambo General Hospital from January 2018 to December 2021 were included in the source population. All patients who have been tested for HBV and HCV and whose results were recorded on the laboratory registration log book at Ambo General Hospital from January 2018 to December 2021 within the specified period were the study population of this study.

Inclusion and Exclusion Criteria

Inclusion Criteria

All HBV and/or HCV suspected and screened patients, whose

results were recorded on the laboratory registration logbook from January 2018 to December 2021, and who fulfilled all requested format information, like age, sex, date, month, years of examination, and hepatitis status, were included in this study.

Exclusion Criteria

Patient records without full information were excluded

Data Collection Procedure

Three medical laboratory technologists extracted data for all HBV and/or HCV suspected and tested patients whose findings were documented on the laboratory registration logbook from January 2018 to December 2021. Age, sex, the year of screening, and the HBV and HCV status were gathered as pertinent characteristics.

Statistical Analysis

Using SPSS version 25.0, we conducted univariate and multivariate regression to estimate odds ratios with 95% confidence intervals (CI) for potential predictors for HBV and HCV infection. We included demographic variables such as sex and age. Microsoft Excel was used to evaluate the trend of hepatitis.

Ethical Consideration

All procedures performed in this study were performed according to the guidelines and regulations approved by the Research Ethics Review Committee of the Ambo University, College of Health Sciences and Referral Hospital, Department of Medical Laboratory Sciences, to obtain permission for collecting the data.

Results

Socio-Demographic Characteristics

A total of 5,675 serologically tested patients were included in our study. Of these, 637 (11.2%) were male and 5,038 (88.8%) were female, so the majority of study participants were females. The majority of study subjects were aged 15-34 years old, 4,891 (86.2%) [Table 1].

Table 1: Socio-demographic characteristics among people who were tested for HBV and HCV from January 2018 to December 2021 at Ambo General Hospital, Ambo, Ethiopia.

Variables		Frequency	Percentage (%)
Sex	Male	637	11.2
	Female	5035	88.8
Age	<15	156	2.7
	15-24	2378	41.9
	25-34	2513	44.3
	35-44	434	7.6
	45-54	95	1.7
	>54	97	1.8

Sero-Prevalence of HBV and HCV

The overall prevalence of HBV and HCV was 365/5674(6.4%) and 11/524(2.1%), respectively. Among the study participants, the prevalence of HBV was 77(12.1%) among males and 288(5.72%) among females, while the positivity of HCV was

7/122(5.7%) among males and 4/402(1.0 %) among females. Hepatitis B virus was predominantly higher among individuals aged 45-54 years old (11.6%), followed by >54 years old (9.28%). On the other hand, the prevalence of hepatitis C virus was high among the age group of 35-44 years old (5.6%) followed by 45-54 years old (4.0%). Moreover, a high percentage of HBV (7.1%) and HCV (5.5%) were seen in the years 2018 and 2020, respectively [Table 2].

Table 2: Prevalence of HBV and HCV infection among people who were tested for HBV and HCV from January 2018 to December 2021 at Ambo General Hospital, Ambo, Ethiopia.

Characteristics	Category	HBsAg		Anti-HCV		Co-infection	
		No of HBV suspected	Percent of HBV positive	No of HCV suspected	Percent of HCV positive	HBV & HCV suspected	HBV & HCV positive
Sex of patients	Male	636	77(12.1)	122	7(5.7)	122	2(1.6)
	Female	5039	288(5.72)	402	4(1.0)	402	1(0.25)
	Total	5675	365(6.4)	524	11(2.1)	524	3(0.6)
Age of patients	<15	156	12(7.7)	24	0	24	0
	15-24	2378	160(6.7)	197	4(2.0)	197	1(0.5)
	25-34	2513	141(5.6)	179	1(0.6)	179	0
	35-44	434	31(7.14)	72	4(5.6)	72	2(2.8)
	45-54	95	11(11.6)	25	1(4.0)	25	0
	>54	97	9(9.28)	27	1(3.7)	27	0
	Total	5,674	365(6.4)	524	11(2.1)	524	3(1.6)
Year of examinations	2018	1,110	79(7.1)	227	1(0.44)	227	0
	2019	1,289	80(6.2)	187	4(2.1)	187	3(1.6)
	2020	1,857	118(6.4)	110	6(5.5)	110	0
	2021	1,418	88(6.2)	0	0	0	0
	Total	5674	365(6.4)	524	11(2.1)	524	3(0.6)

Factors Associated with Hepatitis B Virus Infection

According to the bivariate analysis, both sex and age variables showed a P-value less than 0.25 and were transported to multivariate analysis. Accordingly, in multivariate analysis, being a male was significantly associated with HBV infection [AOR = 2.186 (95% CI: 1.652, 2.892, p <0.001], and age groups did not show a significant association with HBV infection [Table 3].

Table 3: Factors associated with hepatitis B among study participants at Ambo General Hospital from January 2018 to December 2021.

Variables		HBV		COR (95% CI)	P-value	AOR (95% CI)	p-value
		Pos (%)	Neg (%)				
Sex	Male	12.1	87.9	2.272 (1.741, 2.966)	<0.001	2.186 (1.652, 2.892)	<0.001
	Female	5.72	94.28	1		1	
Age	<15	7.7	92.3	1	1	1	
	15-24	6.8	93.2	1.213 (.492, 2.996)	.675	.989 (.398, 2.460)	.981
	25-34	5.6	94.4	1.402 (.693, 2.834)	.347	1.033 (.502, 2.128)	.929
	35-44	7.14	92.8	1.701 (.839, 3.447)	.140	.875 (.423, 1.810)	.718
	45-54	11.6	88.4	1.315 (.605, 2.859)	.490	1.028 (.467, 2.263)	.945
	>54	9.28	90.7	.772 (.305, 1.957)	.586	1.368 (.536, 3.490)	.512

Factors Associated with Hepatitis C Virus Infection

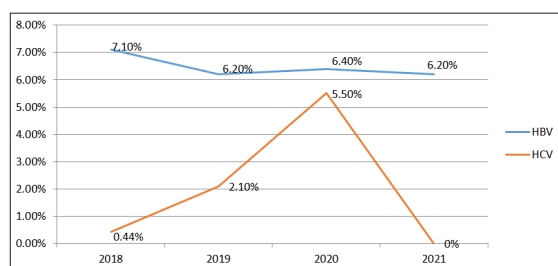
Bivariate logistic regression analysis was performed to assess the association between dependent and independent variables. According to the bivariate analysis, only the sex of the study participants showed a P-value less than 0.25. However, being a male was not significantly associated with HCV infection [AOR = 2.262(95% CI: .797, 6.420, p = 0.125) [Table 4].

Table 4: Factors associated with hepatitis C among study participants at Ambo General Hospital from January 2018 to 2021 December.

Variables		HBV		COR (95% CI)	P-value	AOR (95% CI)	p-value
		Pos (%)	Neg (%)				
Sex	Male	7.5	92.5	.442 (.156, 1.254)	0.125	2.262(.797, 6.420)	0.125
	Female	3.5	96.5	1	1	1	
Age	<15	6.25	93.75	1	1		
	15-24	4.8	95.2	1.333 (.146, 12.210)	.799		
	25-34	3.5	96.5	1.844 (.180, 18.938)	.606		
	35-44	7.84	92.16	.783 (.081, 7.560)	.833		
	45-54	4.2	95.8	1.533 (.089, 26.431)	.769		
	>54	4.00	96	1.600 (.093, 27.547)	.746		

Trend Prevalence of HBV and HCV Infections

The trend prevalence of HBV and HCV was relatively fluctuating from year to year. The prevalence of HBsAg was 79/1110(7.1%) in 2018, 80/1289(6.2%) in 2019, 118(6.4%) in 2020 and 88(6.2%) in 2021. The anti-HCV prevalence was 1/227(0.44%) in 2018, 4/187(2.1%) in 2019, 6/110 (5.5%) in 2020, and in 2021, the test was not done [figure 2].

**Figure 2: Trend prevalence of Hepatitis B and C viruses**

Discussion

In this study, the prevalence of HBV and HCV was 6.4% and 2.1%, respectively. This prevalence is moderate according to the WHO. The prevalence of HBsAg is similar to a study conducted among women attending antenatal clinics in West Hararghe public hospitals, Oromia region, Ethiopia, which was 6.1%. Again, our study is also relatively similar to the study conducted among migrants attending a center in Madrid in Spain, which was 6% for HBV, and it showed a similar prevalence of HCV (2%) [6,9,10].

However, the prevalence of HBV (6.4%) in this study is relatively higher than the prevalence of HBV (3.9%) reported from a recent retrospective study done in Addis Alem Primary Hospital, Bahir Dar, Northwest Ethiopia and a study conducted in Central West Argentina (1.8%). This result variation might be due to the differences in sociocultural. On the other hand, the prevalence of this study relatively lower than the study conducted among clients visiting ‘Tefera Hailu’ memorial hospital, Sekota, Northern Ethiopia, with a prevalence of 21.16 % for HBV and the study conducted among patients attending Gondar University Hospital with a prevalence of 14.4% for HBV and 12.4% for HCV. This difference might be due to sample size and cultural variations [11-14].

The overall prevalence of HBV and HCV co-infection was 0.6%. This finding is lower than the study reported in Ethiopia, Gondar, 2%. This is due to the difference in the sample size of the study participants and the socio-cultural context of the society. The result of our study showed that most of the positive study participants were found in the age category of 45-54 years old (11.6%) for HBV and 35-44 (5.6%) for HCV. This result is not similar to the result of the study conducted at Gondar University that showed HBV was found to be more prevalent among study subjects aged 25-34 years old (30.2%), and HCV was more prevalent among those aged 15-24 years old (30.7%) [14]. In our study, the prevalence of hepatitis was higher among males than among females, which was similar to a study conducted in Sierra Leone [15,16]. However, our result was not similar to a study conducted in Gondar University Hospital [14]. This might be due to the majority of our study participants were females. The trend of both HBV and HCV was relatively fluctuating from year to year. The highest prevalence was recorded in 2018(7.1%) for HBV and in 2020 (5.5%) for HCV.

Conclusion

The prevalence of HBV in our study area is considerably higher than HCV among patients who have tested at the hospital. The prevalence of both HBV and HCV was higher in males than in females. HBV is more prevalent in the age group from 45-54, while HCV is more prevalent in the age group from 35-44. These groups of age groups are working age, so it affects the economy of the countries. The prevalence of both HBV and HCV fluctuated from year to year. This indicates that follow-up should be undertaken by providing the materials necessary for the diagnosis, which can prevent the underestimation of the prevalence. Therefore, consideration should be given by the government and non-government organizations on diagnosis, prevention & control of this virus transmission in the study area.

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Author Contributions

Mulugeta Getachew, Amanuel Teferi, and Edosa Kebede are involved in the conception of the research idea, design, and data collection, analysis, and interpretation of the findings. The manuscript was written by Mulugeta Getachew, and all the other authors have read and approved the final manuscript.

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