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Exploring Disease Manifestations and Influencing Factors in Acute and Chronic Hepatitis B

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Abstract

Scope and Aims: The investigation of disease manifestations and influencing factors in both acute hepatitis B (AHB) and chronic hepatitis B (CHB) remains limited, with varying results. This study aimed to explore the factors influencing AHB and CHB and their disease manifestations within a Ghanaian population, with the goal of developing a control strategy. **Methods**: A retrospective study was conducted on 569 admitted hepatitis B cases. Demographic data and disease manifestations were compared between AHB and CHB patients. Logistic regression and correlation analyses were employed to identify the factors influencing the progression of the disease. **Results:** Significant differences were observed between AHB and CHB patients in terms of median age and hospitalization duration. Variations in age, gender, education level, and occupational distributions were statistically significant ($P < 0.05$) between the two groups. Symptoms such as fever, nausea, polydipsia, palpitation, anicteric presentation, anorexia, and itching were less common in CHB patients ($P < 0.05$), while abdominal pain, jaundice, and enlarged liver were more frequent ($P < 0.05$). CHB patients exhibited significantly higher

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levels of aspartate aminotransferase, viral load, bilirubin, prothrombin time, partial thromboplastin time, HBeAg, albumin, abdominal ultrasound findings, and globin ($P < 0.05$), while HBsAg and liver function test levels were significantly lower ($P < 0.05$) in CHB patients compared to AHB patients. Logistic regression identified age, gender, occupation, education level, and hospitalization duration as significant influencing factors. **Conclusion:** Males and the adult population represented a higher proportion of CHB patients, with a significant association between CHB and elevated clinical and laboratory characteristics. Age, gender, occupation, education level, and hospitalization duration were established as key influencing factors in the progression of hepatitis B.

Keywords: Acute hepatitis B, chronic hepatitis B, disease manifestations, control strategy, logistics regression

Introduction

Hepatitis B (HB) is a viral infectious disease that could manifest as either acute or chronic and poses a significant global health challenge. It was estimated that between 500,000 to 1.2 million people died annually due to chronic hepatitis, cirrhosis, and hepatocellular carcinoma (Lavanchy et al., 2004). HB is an inflammation of the liver caused by the Hepatitis B virus (HBV), which is transmitted through contact with infected body fluids, including unsafe sexual contact, blood transfusions, mother-to-child transmission during birth, cuts, and contaminated needles (RIVM, 2013). HBV could remain infectious on surfaces for up to a week (WHO, 2002). In regions with a high prevalence of HBV, such as Sub-Saharan Africa and East Asia, mother-to-child transmission and person-to-person contact during childhood were common. In contrast, transmission in wealthier regions like Western Europe and North America occurred primarily through unsafe sexual contact and injection drug use (WHO, 2013).

There were several clinical stages of HB infection. The time between infection and symptom onset, known as the incubation period, typically ranges from 6 to 26 weeks, depending on the viral dose (RIVM, 2013). Acute Hepatitis B (AHB) could present with symptoms such as fatigue, fever, joint pain, and jaundice, though many cases were asymptomatic (RIVM, 2013). Approximately two-thirds of HBV-infected individuals experienced an asymptomatic acute infection, with most recovering within three to four months and developing lifetime immunity (van Ballegooijen et al., 2009). However, about 1% of AHB cases progressed to fulminant hepatitis, a severe and often fatal condition (van de Laar et al., 2000).

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Chronic Hepatitis B (CHB) occurs when acute infection persists for more than six months, affecting roughly 5% of all cases (van de Laar et al., 2000), although more recent studies indicated higher rates among specific populations, such as men who have sex with men (23%) and drug users (28%) (van Houdt et al., 2012). Chronic infection could lead to severe complications such as cirrhosis and hepatocellular carcinoma, with 25-35% of chronic patients progressing to these conditions and 15-25% dying prematurely as a result (RIVM, 2013). The risk of developing CHB was influenced by age, immune status, and gender, with newborns having a 70-90% chance of progressing to chronic infection compared to 25-50% of children under five and 5-10% of older children and adults. Men were also six times more likely than women to develop CHB. In cases of reduced immunity, HBV replication continued without severe symptoms, leading to chronic carrier status (van de Laar et al., 2000).

Changes in laboratory parameters could sometimes predict HBV infection in patients (Kumar et al., 2008). Preventing, controlling, and treating HBV and its complications requires comprehensive public health strategies. Although treatment for CHB aimed to improve quality of life, many patients, especially those on interferon therapy, experienced fatigue, low self-esteem, and reduced daily functioning (Asadi Noghabi et al., 2010). Several studies explored the risk factors for HBV in various populations, examining their role in disease progression and outcomes. However, the severity of complications is often correlated with clinical and laboratory manifestations (Kumar et al., 2008; Salimi et al., 2014).

In Ghana, the prevalence of HBV infection was high (Averhoff et al., 2016; Howell et al., 2014) and required greater public health attention (Mkandawire et al., 2013; Owusu-Ansah, 2014). Ghana was considered one of the regions with a high prevalence of chronic HBV infection (Averhoff et al., 2016; Howell et al., 2014), with studies estimating a prevalence rate of 10-15% (GhanaWeb, 2013; Teye, 2015). Other studies reported HBV prevalence rates of 6.7-11% among blood donors (Dongdem et al., 2012; Walana et al., 2014), 6.4% among pregnant women (Acquaye et al., 1994), and 15.6% among children (Martinson et al., 1996). A three-year retrospective study among 3,402 blood donors showed an overall seroprevalence of Hepatitis B surface antigen at 9.6% (Walana et al., 2014). Despite these findings, no study specifically examined the influencing factors and disease manifestations of both AHB and CHB patients in Ghana. This study, therefore, aimed to investigate these factors in a Ghanaian population to inform a control strategy for Hepatitis B.

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Methods

Patients

This eight-year retrospective study recruited 569 patients with HB cases from Tamale Teaching Hospital, Ghana. Patients who had tested positive for HBV which had developed into either acute or chronic infections were included in this study. Patients who were diagnosed with liver disease or any other disease other than hepatitis B, such as hepatitis C and autoimmune hepatitis were excluded. The required demographic data on HB were searched from patients' folders at the hospital. This study sought to categorize occupations into children, students, traders, fishermen/farmers, housewives, businessmen, professionals (teachers, health professionals, etc.) and others (unskilled labour, unemployed, etc.). The outcome of the HB at the hospital was based on whether the patient was discharged or died. This study also classified educational levels into illiterate (none), primary, junior high school (JHS), senior high school including technical/vocational (SHS) and tertiary. The hospitalization duration was noted as the date the patient was admitted to the date the patient was eventually discharged or died at the hospital. The hospital approved this study and since data were analysed and reported anonymously, there was no need to request the consent of the participants involved.

Collection of Clinical and Laboratory, Statistical Analysis, Influencing Factors of Acute and Chronic HB

Qualified medical doctors (gastroenterologist) reviewed and extracted clinical and laboratory features from patients' records. The American Association for the Study of Liver Disease (AASLD) practice guidelines regarding the diagnostic criteria were followed to determine the disease manifestations of the patients (AASLD, 2011). Clinical manifestations such as jaundice, enlarged liver, variceal bleeding, abdominal pain, icterus, portal hypertension, anicteric, constipation, dark stool, fatigue, nausea, fever, anorexia, itching, palpitation, polyuria, and polydipsia were selected for this study. Laboratory manifestations were revealed mainly through the following; liver function test (LFT), renal function test (RFT), abdominal ultrasound test (USG), aspartate aminotransferase (AST) test, alanine aminotransferase (ALT) test, Viral load (HBV DNA- using Polymerase Chain Reaction) test, Hepatitis B surface antigen (HBsAg) test, hepatitis B e-antigen (HBeAg) test and lipid profile. The laboratory features were recorded as AST, ALT, prothrombin time (PT), partial thromboplastin time (PTT), bilirubin, globulin, albumin, hemoglobin, abdominal USG, RFT, LFT, HBsAg, HBeAg, viral load (HBV DNA) concentration and total cholesterol.

SPSS version 21 was used to analyze the data. Continuous variables were described as median with inter-quartile range (median (IQR)) for skewed

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distributions. Categorical variables were also indicated in percentages. Comparisons between continuous variables were conducted using the Student's t-test or independent-samples Mann-Whitney U test. The chi-square test or Fisher's exact test and Spearman correlation were used for the categorical variables. Binary logistic regression was used to find out the influencing factors of HB diagnosis and the results were recorded. Odds ratios (OR) with 95% confidence intervals (CI) were used to display the results.

The clinical and laboratory features as well as demographic characteristics were compared between AHB and CHB patients. $P < 0.05$ was used to indicate the significance level.

A logistic regression model was employed to gain a deeper comprehension of the variables impacting the advancement of Hepatitis B into its acute and chronic stages. With the use of this model, we were able to examine the relationship between a number of predictor variables (including age, gender, occupation, educational level, hospitalization and location) and the binary outcome of the Hepatitis B categorization (Acute versus Chronic). The logistic regression equation is defined as follows:

$$ln\ ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \ldots\ldots\ldots + \beta_n X_n$$

Where:

- P is the probability of a patient having CHB.
- X_1, X_2, ……..., X_n are the predictor variables (including age, gender, occupation, educational level, hospitalization and location).
- β_0 is the intercept of the model.
- β_1,β_2,…,β_2 are the coefficients representing the impact of each predictor on the probability of CHB.

Results

A total of 569 patients were diagnosed with the majority being AHB representing 355(62.4%) and a little above one-third (214(37.6%)) constituting CHB patients. A greater number of patients 455(80%), who visited the hospital facility with HB cases within the study period were discharged leaving 114(20%) dead at the facility. Most of the patients 204(35.9%) who presented cases of HB to the Tamale Teaching Hospital were farmers/fishermen. Persons belonging to the business community recorded fewer cases 11(1.9%). HB cases were high 388(68.2) among patients without formal education but fewer among patients with at least primary to tertiary education (31.8%). The Northern region registered the highest number

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of patients 470(82.6%) who visited the facility. Hardly did the hospital receive HB patients from Oti region 2(0.4%) (Table 1).

Table 1: Demographic characteristics

Variables	Frequency (%)
Disease Outcome	
Dead	114(20)
Discharge	455(80)
Hepatitis Diagnosis	
Acute	355(62.4)
Chronic	214(37.6)
Educational level	
None	388(68.2)
Primary	38(6.7)
JHS	17(3.0)
SHS	44(7.7)
Tertiary	82(14.4)
Occupation	
Child	34(6.0)
Student	67(11.8)
Trader/stop attendant	70(12.3)
Fishermen/Farmer	204(35.9)
Housewife	19(3.3)
Businessman	11(1.9)
Professional	72(12.7)
Others	92(16.2)
Residence(region)	
Northern	470(82.6)
Savanna	31(5.4)
Upper East	41(7.2)
Upper West	6(1.1)
North East	19(3.3)
Oti	2(0.4)

There was a significant difference in median age for acute and chronic patients (32 (24, 42) vs. 35 (28, 45) years, ($P < 0.05$). The hospitalization duration was also significant between acute (6(4,9)) and chronic (7(4,11)) HB patients. It implied that the chronic HB patients spent more days at the hospital than the acute patients. The variations in age distribution between the acute and chronic patients were statistically significant ($P<0.05$). The majority of the chronic HB patients were males (89.3%); however, females constituted the highest number of acute HB patients. More CHB patients (25.2%) died compared to the AHB, though, the majority of the AHB (83.1%) patients were discharged from the hospital. A higher number of acute HB patients had primary, JHS and no education but less number for SHS and tertiary education compared to the CHB patients ($P < 0.05$). There were more chronic HB patients as students, traders, businessmen, professionals, and others but less as children, fishermen/farmers, and housewives compared to the acute. Most

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acute HB patients lived in the Northern region (84.4%), meanwhile, both acute and chronic HB patients hardly came from the Oti region. The demographic characteristics of the two groups are summarized in Table 2.

Table 2: Demographic features on disease diagnosis

Variables	Hepatitis B Diagnosis		*P*-value
	Acute (%)	Chronic (%)	
Age(years)			0.005*
< 5	12(3.4)	1(0.5)	
5 to < 15	22(6.2)	3(1.4)	
15 to < 50	267(75.2)	175(81.8)	
50 and above	54(15.2)	35(16.4)	
Gender			0.005*
Female	70(19.7)	23(10.7)	
Male	285(80.3)	191(89.3)	
Hospitality duration	6(4,9)	7(4,11)	0.003*
Disease Outcome			0.016*
Dead	60(16.9)	54(25.2)	
Discharge	295(83.1)	160(74.8)	
Educational level			0.000*
None	256(72.1)	132(61.7)	
Primary	24(6.8)	14(6.5)	
JHS	12(3.4)	5(2.3)	
SHS	12(3.4)	32(15.0)	
tertiary	51(14.4)	31(14.5)	
Occupation			0.000*
Child	30(8.5)	4(1.9)	
Student	41(11.5)	26(12.1)	
Trader/stop attendant	43(12.1)	27(12.6)	
Fishermen/Farmer	138(38.9)	66(30.8)	
Housewife	16(4.5)	3(1.4)	
Businessman	4(1.1)	7(3.3)	
Professional	44(12.4)	28(13.1)	
Others	39(11.0)	53(24.8)	
Residence(region)			0.603
Northern	301(84.8)	169(79.0)	
Savanna	16(4.5)	15(7.0)	
Upper East	24(6.8)	17(7.9)	
Upper West	3(0.8)	3(1.4)	
North East	10(2.8)	9(4.2)	
Oti	1(0.3)	1(0.5)	

*Indicates significant association ($p<0.05$); JHS, junior high school; SHS, Senior high school

Fever, nausea, polydipsia, palpitation, anicteric, anorexia and itching were less frequent, while, abdominal pain, jaundice and enlarged liver were more frequent in chronic HB than in acute HB patients. No significant differences were observed in the other clinical features between AHB and CHB patients ($P > 0.05$). The AST, viral load, bilirubin, PT, PTT, and HBeAg levels were significantly higher in chronic HB than in acute HB patients.

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Serum albumin, abdominal USG, and globin were lower but LFT and HBsAg were higher in AHB than in CHB patients ($P < 0.05$). ALT, hemoglobin, RFT and total cholesterol levels were similar between AHB and CHB patients ($P > 0.05$). The prevalence of fever, nausea, polydipsia, palpitation, anicteric, anorexia, and itching correlated negatively with disease diagnosis (all r_s= negative, $P < 0.05$) but abdominal pain, jaundice and enlarged liver correlated positively (all r_s= positive, $P < 0.05$). AST, viral load, HBeAg, PT, PTT, bilirubin, albumin, abdominal USG, and globulin also correlated positively (all r_s= positive, $P < 0.05$) with disease diagnosis whereas HBsAg and LFT correlated negatively (all r_s= negative, $P < 0.05$) with disease diagnosis. There was no significant difference in the other laboratory or clinical characteristics between acute and chronic HB patients ($P > 0.05$). Clinical and laboratory characteristics of HB diagnosis are detailed in Table 3.

Table 3: Comparison of clinical and laboratory characteristics and disease diagnosis

Disease manifestations	Disease Diagnosis		*P*	r_s value
	Acute (%)	Chronic (%)		
Abdominal Pain	292(82.3)	206(96.3)	0.000*	0.205*
Jaundice	275(77.5)	198(90.2)	0.000*	0.161*
Fever	76(21.4)	23(10.7)	0.001*	-0.136*
Nausea	50(14.1)	12(5.6)	0.002*	-0.132*
Constipation	30(8.5)	13(6.1)	0.299	NS
Vericeal bleed	34(9.6)	32(15.0)	0.052	NS
Icterus	32(9.0)	28(13.1)	0.126	NS
Enlarge Liver	38(10.7)	44(20.6)	0.001*	0.136*
Polyuria	29(8.2)	12(5.6)	0.252	NS
Fatigue	18(5.1)	15(7.0)	0.338	NS
Polydipsia	13(3.7)	2(0.9)	0.049*	-0.082*
Palpitation	19(5.4)	4(1.9)	0.041*	-0.086*
Anicteric	13(3.7)	2(0.9)	0.049*	-0.082*
Anorexia	19(5.4)	2(0.9)	0.007*	-0.114*
Dark stool	24(6.8)	7(3.3)	0.076	NS
Portal Hypertension	14(3.9)	4(1.9)	0.171	NS
Itching	19(5.4)	2(0.9)	0.007*	-0.114*
High AST	108(30.4)	116(54.2)	0.000*	0.236*
High ALT	202(56.9)	128(59.8)	0.495	NS
Viral Load	8(2.3)	28(13.1)	0.000*	0.216*
HBeAg	3(0.8)	97(45.3)	0.000*	0.566*
HBsAg	65(18.3)	13(6.1)	0.000*	-0.172*
PT	285(80.3)	199(93.0)	0.000*	0.173*
PTT	285(80.3)	199(93.3)	0.000*	0.173*
High Bilirubin	269(75.8)	194(90.7)	0.000*	0.185*
Low albumin	264(74.4)	193(90.2)	0.000*	0.193*
Low haemoglobin	90(25.4)	62(29.0)	0.344	NS
Abdominal USG	41(11.5)	56(26.2)	0.000*	0.188*
Low globulin	74(20.8)	77(36.0)	0.000*	0.166*
RFT	38(10.7)	18(8.4)	0.374	NS
Total Cholesterol	25(7.0)	17(7.9)	0.690	NS
LFT	10(2.8)	0(0)	0.016*	-0.104*

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*Indicates significant association ($p<0.05$); NS, not significant; HB, hepatitis; r_s, correlation coefficient; RFT, renal function test; LFT, liver function test; HBsAg, Hepatitis B surface antigen; HBeAg, hepatitis B e-antigen; AST, aspartate aminotransferase; ALT, alanine aminotransferase; PT, prothrombin time; PTT, partial thromboplastin time.
Influencing factors of acute and chronic HB

From Table 4, Binary logistic regression was conducted to ascertain the influential factors associated with the diagnosis of HB. The findings revealed that with an additional one-year increase in age, patients (OR= 1.017, CI= 1.001, 1.032; $P < 0.05$) were more likely to be diagnosed with chronic HB. When compared to the female patients, the males (OR= 2.040, CI= 1.111, 3.743; $P < 0.05$) were twice more likely to be diagnosed with chronic HB. Comparison made to patients who were children revealed that, traders (OR= 4.459, CI= 1.117, 17.805; $P < 0.05$) and others (OR= 9.879, CI= 2.560, 38.130; $P < 0.05$) were four and nearly ten times likely to have chronic HB respectively. Primary (OR= 2.857, CI= 1.201, 6.797; $P < 0.05$) and SHS (OR= 8.838, CI= 3.381, 23.101; $P < 0.05$) level of education were respectively nearly three and nine times more likely to be diagnosed with chronic HB when compared with patients with no education. The study also established that if the hospitalization duration was increased by a day, patients (OR= 1.040, CI= 1.010, 1.071; $P < 0.05$) were more likely to be diagnosed with CHB than the AHB. It was found that age, gender (male), occupation (traders & others), educational level (primary & SHS) and hospitalization duration were influential factors of HB diagnosis (all $P < 0.05$).

The logistic regression model was given as:

$$ln\,(P/(1-P)) = -3.748 + 0.017 * Age + 0.713 * Gender + 1.495 * Occupation + 1.050 * Educational\ level + 0.039 * Hospitalization + 0.413 * Location$$

The Logistic regression model for significant factors was given as

$$ln\,(P/(1-P)) = -3.748 + 0.017 * Age + 0.713 * Gender + 1.495 * Occupation + 1.050 * Educational\ level + 0.039 * Hospitalization$$

Probability Prediction

A respondent of 35 years old man (1), who was a trader (1) with a primary level of education (1) and had been hospitalized for average days of six and a half. The probability of predicting CHB compared with AHB among the patients given the above characteristics would be given as:

$$ln\,(P/(1-P)) = -3.748 + 0.017 * Age + 0.713 * Gender + 1.495 * Occupation + 1.050 * Educational\ level + 0.039 * Hospitalization$$

$$P = 1/(1 + e\text{^}(-3.748 + 0.017 * Age + 0.713 * Gender + 1.495 * Occupation + 1.050 * Educational\ level + 0.039 * Hospitalization))$$

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$$P = 1/(1 + e\text{^}(-3.748 + 0.017(35) + 0.713(1) + 1.495(1) + 1.050(1) + 0.039(6.5)))$$
$$P = 1/(1 + e\text{^}(-3.748 + 0.595 + 0.713 + 1.495 + 1.050 + 0.2535))$$
$$P = 1/(1 + e\text{^}(0.3585))$$
$$P = 1/(1 + 2.7183)$$
$$P = 1/(3.7183)$$
$$P = 0.2689$$

Based on these clinical and demographic factors, it was determined that the likelihood of this individual having chronic hepatitis B was 26.9%. Even though these characteristics could increase the risk of CHB, the likelihood showed that the risk was low and that there might be other factors at play as well, which could affect the probability either way.

Table 4: Binary Logistic regression showing the factors of Acute and Chronic HB

Factors		B	P-value	Exp (B) / OR	95% C.I for Exp (B)	
					Lower	Upper
Age		0.017	0.027	1.017	1.001	1.032
Gender		0.713	0.021	2.043	1.114	3.747
Occupation	traders	1.495	0.034	4.459	1.117	17.805
	others	2.290	0.001	9.879	2.560	38.130
Education	primary	1.050	0.018	2.857	1.201	6.797
	SHS	2.179	0.000	8.838	3.381	23.101
Hospitalization		0.039	0.010	1.040	1.010	1.071
Location		0.413	0.321	1.511	0.669	3.414
Constant		-3.748	0.000	0.024		

Discussion

Hepatitis B is a significant public health concern that can progress into chronic liver disease, cirrhosis, and hepatocellular carcinoma (Deny et al., 2010). Hepatitis B Virus (HBV) infections can result in a wide range of clinical manifestations. Approximately 90-95% of HBV infections in adults resolve as acute infections with subsequent viral clearance, while 5-10% progress to chronic infections (He et al., 2006; Ganem et al., 2004; Rehermann et al., 2005). A study on both adults and children showed that older individuals, particularly females, are more likely to develop clinical disease compared to younger individuals. In children under 5 years, only 9.5% develop clinical hepatitis after acute HBV infection compared to 33.3% of adults aged 30 years and above (McMahon et al., 1985).

Our study yielded similar findings, showing that age distribution is significant, with a higher proportion of older individuals and females among acute HB patients, and a lower prevalence of chronic HB in children. We also observed that fever, nausea, polydipsia, palpitation, anicteric presentation, anorexia, and itching are less common, while abdominal pain, jaundice, and enlarged liver are more frequent in chronic HB compared to acute HB patients.

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In line with our findings, a study on acute HB in pregnant and non-pregnant patients found fever to be associated with HB, while fatigue levels were similar between the two groups (Han et al., 2014). Conversely, Nazarnezhad et al. (2018) found no significant association between fever and HB. Our study also established that levels of AST, viral load, bilirubin, prothrombin time (PT), partial thromboplastin time (PTT), and HBeAg were significantly higher in chronic HB compared to acute HB patients. Serum albumin, abdominal ultrasound (USG), and globin were lower, while liver function test (LFT) and HBsAg levels were higher in acute HB patients. Contrary to our findings, Hugo et al. (2018) detected no HBsAg, indicating no acute or chronic infection.

Our results regarding AST being higher in chronic HB are supported by Sali et al. (2013), though their findings differ in relation to ALT levels, which they found to be higher in chronic HB, unlike our study where ALT, hemoglobin, renal function test (RFT), and total cholesterol levels were similar between acute and chronic HB patients. Additionally, Han et al. (2014) found varied results in relation to HBsAg and AST levels in non-pregnant patients, though they did observe a similar pattern to our study for serum bilirubin levels. Nazarnezhad et al. (2018) also revealed that AST and PT were significant, but ALT and total cholesterol were not, while our study found these factors insignificant. Furthermore, Nazarnezhad et al. (2018) found hemoglobin levels to be significant in chronic HB, while PTT levels were not, in contrast to our findings.

The T-cell-mediated HBV-specific immune response is reflected in elevated serum ALT levels or symptoms (Ratnam et al., 2008). The relatively insignificant clinical symptoms and lower laboratory parameters in acute and chronic HB patients may indicate differences in their immune response. According to acute hepatitis B guidelines, patients who are HBV DNA-positive or HBsAg-positive are considered chronic carriers (CDCP, 2005), and should be counselled accordingly.

Our study found that the prevalence of fever, nausea, polydipsia, palpitation, anicteric symptoms, anorexia, and itching correlated negatively with disease diagnosis, while abdominal pain, jaundice, and enlarged liver correlated positively. This is consistent with Nazarnezhad et al., who found a significant association between anorexia, nausea, enlarged liver, and jaundice in HB patients. Additionally, AST, viral load, HBeAg, PT, PTT, bilirubin, albumin, abdominal USG, and globulin were positively correlated with disease diagnosis, while HBsAg and LFT were negatively correlated. Similar findings were reported by Keshvari et al. (2015) and Li et al. (2018), who also found that HBV DNA and HBsAg correlated significantly with chronic HB patients. However, both studies contradicted our results by indicating that bilirubin and AST levels do not significantly correlate with chronic HB.

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Binary logistic regression in this study revealed that age, gender, occupation, educational level, and hospitalization duration are key factors influencing HB diagnosis. Several studies (Alavian et al., 2012; Gheorghe et al., 2013; Khan et al., 2011) support our finding that age is a significant factor, though Yang et al. (2017) disagreed. Regarding gender, our study aligns with previous research (Behal et al., 2008; Deng et al., 2013; Khan et al., 2011; Ochola et al., 2013; Ozer et al., 2011), which found a higher prevalence in males, though other studies (Alavian et al., 2012; Yang et al., 2017) report contrary findings. Our study also found the educational level to be a significant factor, with a decreasing prevalence of HB associated with higher education, possibly due to increased awareness and higher vaccine uptake (Hur et al., 2012). Most patients (two-thirds) had no formal education, suggesting that awareness campaigns should be tailored to less educated populations. Similarly, Yang et al. (2017) identified occupation as a significant factor, with a higher incidence of HB in farming and fishing communities, raising public health concerns.

Discrepancies between studies may be attributed to genetic, sociodemographic, and environmental factors, differences in study design, and patient selection. To our knowledge, this is the first study in the region that has comprehensively reviewed influencing factors and disease manifestations in acute and chronic HB patients with the aim of developing a control strategy. However, data collection was retrospective, introducing the possibility of recall bias, some patients were excluded due to insufficient data and also, data were collected from a single teaching hospital which may not fully represent the broader population.

Conclusions

This study revealed that males as well as adults constitute a higher percentage of patients with CHB and also spent more days on admission. It was established that AHB patients were mostly uneducated and very dominant in the farming/fishing community. Even though a significant number of disease manifestations were associated with CHB patients, laboratory features were predominantly associated with CHB patients while also a greater number of clinical features were significantly associated with AHB patients. Age, gender, occupation, educational level, and hospitalization duration were established as the influencing factors of HB in the study. It is satisfying to note that the findings of this study can be used to create clinical management and awareness programs for hospitals and the public respectively. Hepatitis B education targeted at the uneducated population may be considered as a potential strategy for preventing the menace. A further study may look at clinical and basic studies to validate the findings and also explain the fundamental mechanisms.

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