

Frequency of Hepatic Steatosis among Patients with Hepatitis B Virus Infection at the Borgou-Alibori University Hospital, Benin, in 2025

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Abstract

Introduction: Hepatic steatosis is common among patients with hepatitis C virus infection. However, this comorbidity has not been adequately investigated in patients with hepatitis B virus (HBV) infection. The aim of this study was to determine the frequency of hepatic steatosis among patients with HBV infection in northern Benin in 2025. **Methods:** A cross-sectional study with prospective data collection was conducted between 7 May and 31 August 2025 at the Borgou-Alibori University Hospital (CHUD-B/A). Eligible participants were adults aged ≥ 18 years with chronic HBV infection who attended the Hepatology and Gastroenterology outpatient clinic and had completed the minimum required diagnostic work-up. The dependent variable was the presence of hepatic steatosis as diagnosed by abdominal ultrasonography. **Results:** Ninety-five patients were included, of whom 13 had hepatic steatosis, yielding a frequency of 13.7%. Their mean age was 43.8 ± 11.5 years. Nine patients (69.2%) were male, corresponding to a male-to-female ratio of 2.2. Eight patients (61.5%) resided in rural areas, and 10 (76.9%) did not engage in regular physical activity. Four patients (30.8%) were overweight, whereas seven (53.8%)

were obese. Central obesity was present in 10 patients (76.9%). *Conclusion:* Hepatic steatosis is common among patients with HBV infection managed at the CHUD-B/A in northern Benin in 2025. A larger-scale study including a greater number of patients is warranted to clarify the relationship between HBV infection and hepatic steatosis and to identify factors independently associated with hepatic steatosis in this population.

Keywords

Hepatic Steatosis, Hepatitis B Virus, Frequency, Northern Benin

1. Introduction

Viral hepatitis remains a major global public health challenge. In 2022, an estimated 254 million people worldwide were living with chronic hepatitis B virus (HBV) infection [1]. Data from 187 countries indicate that viral hepatitis was responsible for an estimated 1.3 million deaths in 2022, of which 83% were attributable to HBV infection [1]. In Africa, chronic viral hepatitis affects more than 91 million individuals, including approximately 82 million living with HBV infection [2]. According to available estimates, 80,000 HBV-related deaths were recorded in the WHO African Region in 2019 [2].

With the global rise in obesity and metabolic syndrome, the coexistence of hepatic steatosis in patients with chronic viral hepatitis has become increasingly common and clinically relevant [3]. In Romania, hepatic steatosis was identified in 47% of patients with chronic HBV infection in 2014 [4]. Hepatic steatosis has long been recognized as a common histopathological feature of chronic hepatitis C infection [5]. Indeed, hepatic steatosis has been reported in 35% to 81% of patients with chronic hepatitis C [5]. By contrast, this association has not been sufficiently investigated in patients with chronic HBV infection.

The impact of hepatic steatosis on the natural history of HBV infection, particularly with regard to the development of cirrhosis and hepatocellular carcinoma, remains controversial. Although hepatic steatosis is a well-established risk factor for adverse hepatic outcomes, including cirrhosis and hepatocellular carcinoma, its interactions with HBV infection and their clinical implications appear to be complex. Hepatic steatosis may suppress HBV replication, potentially attenuating HBV-related liver injury. Conversely, associated comorbidities, such as diabetes mellitus and obesity, may increase the risk of disease progression and adverse hepatic outcomes [6].

Data on the frequency of hepatic steatosis among patients with HBV infection in Africa remain scarce. In Togo, a hospital-based study conducted in 2024 reported an overall hepatic steatosis frequency of 17.2% [7]. Hepatic steatosis was identified in 12.6% of patients with HBV infection and in 4.59% of those with HBV-HCV coinfection [7]. In southern Benin, the frequency of hepatic steatosis among patients with HBV infection was 10.2% in 2019 [8]. In northern Benin,

however, HBV infection remains highly prevalent, with a prevalence of 12.7% among first-time blood donors in 2017, compared with a national prevalence of 6% reported in 2019 [9] [10]. Nevertheless, data on the frequency of hepatic steatosis in this population remain limited. The present study was therefore undertaken to determine the frequency of hepatic steatosis among patients with HBV infection in northern Benin in 2025.

2. Patients and Methods

Study setting: This study was conducted in the Department of Internal Medicine of the Borgou-Alibori University Hospital (CHUD-B/A), located in northern Benin.

Study design and study period: This was a cross-sectional study with prospective data collection conducted from 7 May to 31 August 2025.

Study population: The source population consisted of patients with chronic hepatitis B virus (HBV) infection attending the Hepatology and Gastroenterology outpatient clinic at the CHUD-B/A. Eligible participants were adults aged 18 years or older with chronic HBV infection, defined by two positive hepatitis B surface antigen (HBsAg) tests performed at least 6 months apart, who had undergone the minimum required diagnostic work-up. Patients were excluded if they declined to provide informed verbal consent, had hepatitis C virus (HCV) infection, were pregnant, or had liver cirrhosis and/or hepatocellular carcinoma.

Sampling: Consecutive exhaustive sampling was performed by enrolling all eligible patients who attended the outpatient clinic during the study period.

Outcome measures: Alcohol consumption was considered excessive when it exceeded 20 g per day for women and 30 g per day for men. Physical activity was considered regular when it lasted at least 30 minutes per day and was performed at least three times a week. A diet high in fat and sugar was defined based on patient self-reporting. The minimum diagnostic work-up included abdominal ultrasonography, serum aminotransferases, serum albumin, prothrombin time, complete blood count, human immunodeficiency virus (HIV) serology, anti-HCV antibody testing, and quantitative HBV DNA measurement. Central obesity was defined as a waist circumference ≥ 80 cm in women and ≥ 94 cm in men. Hepatic steatosis was diagnosed non-invasively by abdominal ultrasonography based on the presence of diffusely increased hepatic echogenicity relative to the renal cortex, associated with posterior beam attenuation and impaired visualization of the intrahepatic vasculature, particularly the portal veins. The ultrasound was performed by two physicians specializing in medical imaging. Liver fibrosis was assessed non-invasively using the FIB-4 index, calculated from the patient's age, serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), and platelet count.

Study variables: The dependent variable was the presence of hepatic steatosis in patients with chronic HBV infection. The independent variables included the patients' sociodemographic, clinical, and laboratory characteristics, together with the results of the non-invasive assessment of liver fibrosis. All variables were collected

at the time of patient enrollment.

Data collection: Data were collected through face-to-face interviews with the participants and by reviewing their medical records.

Statistical analysis: Quantitative variables are presented as mean $\pm$ standard deviation (SD), whereas qualitative variables are expressed as frequencies and percentages.

Ethical considerations: Ethical approval was obtained from the Local Ethics Committee for Biomedical Research of the University of Parakou (CLERB-UP) before initiation of the study (Approval No. 1037/2025/CLERB-UP/P/SP/R/SA). All patient data were anonymized and handled in strict accordance with confidentiality requirements.

3. Results

General characteristics of the study population

During the study period, 542 patients consulted the hepatogastroenterology department, 199 of whom had HBV infection. Of the latter, 104 were excluded or not included (67 due to failure to perform the minimum assessment, 17 due to cirrhosis and/or hepatocellular carcinoma, 12 who did not consent, 7 pregnant women, and 1 with HCV co-infection). In total, 95 HBV-positive patients were selected for the study. Their mean age was 38.9 ± 10.6 years (range: 20 - 72 years). Sixty patients (63.2%) were male, yielding a male-to-female ratio of 1.7.

Frequency of hepatic steatosis

Among the 95 patients included, 13 had hepatic steatosis, corresponding to an overall frequency of 13.7% [0.034; 0.240].

Characteristics of patients with HBV infection and hepatic steatosis

Sociodemographic characteristics

The mean age of patients with HBV infection and hepatic steatosis was 43.8 ± 11.5 years (range: 25 - 69 years). Nine patients (69.2%) were male, corresponding to a male-to-female ratio of 2.2. Six patients (46.1%) were traders, while eight (61.5%) resided in rural areas. **Table 1** summarizes the distribution of HBV-infected patients with or without hepatic steatosis according to sociodemographic characteristics.

Medical history, comorbidities, and lifestyle characteristics

Among the 13 patients with hepatic steatosis, three (23.1%) had diabetes mellitus, one (7.7%) had hypertension, and one (7.7%) had dyslipidemia. None was co-infected with either HIV or HCV. Regarding lifestyle characteristics, two patients (15.4%) reported excessive alcohol consumption, whereas 10 (76.9%) did not engage in regular physical activity. Six patients (46.1%) reported consuming a high-fat diet, and four (30.8%) reported a high-sugar diet. **Table 2** presents the distribution of HBV-infected patients with or without hepatic steatosis according to medical history, comorbidities, and lifestyle.

Clinical findings

Reported symptoms were non-specific and included abdominal pain (6 pa-

tients; 46.1%), asthenia (4 patients; 30.8%), and arthralgia (3 patients; 23.1%). Based on body mass index (BMI), four patients (30.8%) were overweight and seven (53.8%) were obese. Central obesity was present in 10 patients (76.9%). **Table 3** summarizes the clinical characteristics of patients with chronic HBV infection and hepatic steatosis.

Table 1. Distribution of HBV-infected patients with or without hepatic steatosis according to sociodemographic characteristics, CHUD-B/A, 2025 (n = 95).

	Presence of hepatic steatosis (n = 13)		Absence of hepatic steatosis (n = 82)	
	n	%	n	%
Age (years)				
18 - 29	2	15.4	16	19.5
30 - 39	1	7.7	28	34.2
40 - 49	7	53.8	27	32.9
50 - 59	2	15.4	10	12.2
≥60	1	7.7	1	1.2
Sex				
Male	9	69.2	51	62.2
Female	4	30.8	31	37.8
Place of residence				
Rural	8	61.5	26	31.7
Urban	5	38.5	56	68.3
Occupation				
Trader	6	46.1	16	19.5
Unemployed	0	0	4	4.9
Civil servant	3	23.1	31	37.8
Artisan	1	7.7	9	11.0
Farmer	1	7.7	7	8.5
Student	0	0	7	8.5
Homemaker	0	0	5	6.1
Driver	1	7.7	3	3.7
Religious worker	1	7.7	0	0

Table 2. Distribution of HBV-infected patients with or without hepatic steatosis according to medical history, comorbidities, and lifestyle, CHUD-B/A, 2025 (n = 95).

	Presence hepatic steatosis (n = 13)		Absence hepatic steatosis (n = 82)	
	n	%	n	%
Diabetes mellitus				
Yes	3	23.1	1	1.2
No	10	76.9	81	98.8
Hypertension				
Yes	1	7.7	5	6.1
No	12	92.3	77	93.9

Continued

Dyslipidemia				
Yes	1	7.7	0	0.0
No	12	92.3	82	100
Excessive alcohol consumption				
Yes	2	15.4	1	1.2
No	11	84.6	81	98.8
Regular physical activity				
Yes	3	23.1	26	31.7
No	10	76.9	56	68.3
High-fat diet				
Yes	6	46.1	21	25.6
No	7	53.9	61	74.4
High-sugar diet				
Yes	4	30.8	17	20.7
No	9	69.2	65	79.3

Table 3. Distribution of HBV-infected patients with hepatic steatosis according to clinical characteristics, CHUD-B/A, 2025 (n = 13).

	n	%
Symptoms		
Abdominal pain	6	46.1
Asthenia	4	30.8
Arthralgia	3	23.1
Heartburn	2	15.4
Belching	2	15.4
No symptoms	2	15.4
Borborygmi	1	7.7
Altered bowel habits	1	7.7
Regurgitation	1	7.7
Body mass index		
Normal	2	15.4
Overweight	4	30.8
Obesity	7	53.8
Central obesity		
Yes	10	76.9
No	3	23.1

Laboratory and imaging findings

Abdominal ultrasonography demonstrated diffuse, homogeneous hepatic steatosis in 11 patients (84.6%). Homogeneous hepatomegaly was observed in 6 patients (46.1%). Laboratory investigations showed that 12 patients (92.3%) were

hepatitis B e antigen (HBeAg)-negative, whereas 4 (30.8%) had an HBV DNA level > 2000 IU/mL. Six patients (46.1%) exhibited biochemical evidence of hepatocellular injury. No abnormalities were detected on the complete blood count. None of the 13 patients was co-infected with either HIV or HCV. Among the 13 patients, 10 underwent lipid profile testing. Hypertriglyceridemia, hypercholesterolemia, and low high-density lipoprotein (HDL) cholesterol levels were identified in 1 patient (10%), 3 patients (30%), and 2 patients (20%), respectively.

Non-invasive assessment of liver fibrosis

According to the FIB-4 index, all 13 patients were classified as having a low risk of liver fibrosis (FIB-4 < 1.30).

4. Discussion

The present study investigated hepatic steatosis among patients with chronic hepatitis B virus (HBV) infection. This is the first study conducted in northern Benin to address this issue and provides preliminary data that may serve as a basis for future research.

Hepatic steatosis was identified in 13.7% of our patients with chronic HBV infection. This finding is consistent with that reported by Sokpon *et al.* [8] in Cotonou, southern Benin, in 2019, where the prevalence of hepatic steatosis among patients with HBV infection was 10.2%. It is also comparable to the 12.6% prevalence of hepatic steatosis reported by Djagadou *et al.* [7] in Togo in 2024. However, our estimate is lower than those reported by Hatrydt *et al.* [3] in Ivory Coast in 2023 (48.2%), Kallel *et al.* [11] in Tunisia in 2019 (34%), and Moroşan *et al.* [4] in Romania in 2014 (47%). These discrepancies may be explained by differences in the diagnostic methods used. In those studies, hepatic steatosis was diagnosed using controlled attenuation parameter (CAP) measurement during transient elastography (FibroScan®) or liver biopsy, both of which are more sensitive diagnostic modalities than the abdominal ultrasonography used in the present study.

The mean age of patients with both chronic HBV infection and hepatic steatosis was 43.8 ± 11.5 years. This finding is comparable to those reported by Sokpon *et al.* [8] in southern Benin (46 ± 15.7 years) and Hatrydt *et al.* [3] in Ivory Coast (43.1 ± 9.5 years). In our study, men accounted for 69.2% of patients with hepatic steatosis, a predominance similar to that reported in southern Benin (64.8%) [8], Ivory Coast (71.1%) [3], and Tunisia (62.7%) [5].

Cardiometabolic risk factors were common among patients with chronic HBV infection and hepatic steatosis in the present study. Among the 13 affected patients, 11 were overweight or obese, 10 had central obesity, 3 had type 2 diabetes mellitus, 1 had hypertension, and 1 had previously diagnosed dyslipidemia. Similar findings have been reported in patients with chronic HBV infection and hepatic steatosis in Ivory Coast, Tunisia, and China [3] [11] [12]. Given the high prevalence of these cardiometabolic risk factors, it is difficult to attribute hepatic steatosis exclusively to chronic HBV infection. Instead, the hepatic steatosis ob-

served in these patients may represent metabolic dysfunction-associated steatotic liver disease (MASLD) rather than a direct consequence of HBV infection. Furthermore, some patients reported excessive alcohol consumption, which may also have contributed to hepatic fat accumulation.

Several modifiable risk factors were identified among patients with hepatic steatosis, including lack of regular physical activity (10 patients), high-fat dietary intake (6 patients), high-sugar dietary intake (4 patients), and excessive alcohol consumption (2 patients). Physical inactivity contributes to a positive energy balance in which caloric intake exceeds energy expenditure, thereby promoting weight gain. Excess caloric intake that is not offset by physical activity is stored as fat, including within the liver. This process is particularly pronounced when the diet is rich in saturated fats and refined sugars and may ultimately result in hepatic steatosis. Public health interventions aimed at raising awareness of these modifiable risk factors could contribute to reducing the burden of hepatic steatosis in this population.

From a prognostic perspective, all patients were classified as having a low risk of liver fibrosis according to the FIB-4 index, although 6 exhibited biochemical evidence of hepatocellular injury and 4 had an HBV DNA level > 2000 IU/mL. It is noteworthy that 12 of the 13 patients had HBeAg-negative chronic HBV infection. Similarly, Trabelsi *et al.* [5] reported that aminotransferase levels, HBeAg status, and HBV DNA levels did not differ significantly between patients with and without hepatic steatosis.

Nevertheless, this study has several limitations. First, it was conducted at a single center, which may limit the generalizability of the findings. Second, the relatively small number of patients with hepatic steatosis reduced the statistical power of the study and precluded further analytical investigations.

5. Conclusion

Hepatic steatosis is a common condition among patients with chronic hepatitis B virus (HBV) infection in northern Benin in a hospital setting. Unlike chronic hepatitis C virus (HCV) infection, for which the association with hepatic steatosis has been clearly established, the relationship between chronic HBV infection and hepatic steatosis remains a matter of debate. In the present study, the presence of cardiometabolic risk factors and excessive alcohol consumption in some patients represents potential confounding factors, precluding a definitive attribution of hepatic steatosis to HBV infection alone. Further studies involving larger patient cohorts are warranted to clarify the relationship between chronic HBV infection and hepatic steatosis and to identify factors independently associated with hepatic steatosis in this population.

Author Contributions

All authors contributed to data collection and to reviewing and revising the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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