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Hepatitis B Surface Antigen and Hepatitis C Virus Antibodies among Drug Users in Burkina Faso

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Abstract

Introduction: The epidemiology of both hepatitis B virus (HBV) and hepatitis C virus (HCV) infections among drug users (DUs) is little known in West Africa. The study aimed to assess the prevalence of hepatitis B and C viruses among drug users in Burkina Faso. **Methodology:** This was a cross-sectional biological and behavioral survey conducted between June and August 2022, among drug users in Ouagadougou and Bobo Dioulasso, the two main cities of Burkina Faso. A respondent-driven sampling (RDS) was used to recruit drug users. Hepatitis B surface antigen was determined using lateral flow rapid test kits and antibodies to hepatitis C virus in serum determined using an Enzyme-Linked Immunosorbent Assay. Data were entered and analyzed using Stata 17 software. Weighted binary logistic regression was used to identify the associated factors of hepatitis B and C infections and a p-value < 0.05 was considered statistically significant. **Results:** A total of 323 drug users were recruited with 97.5% males. The mean age was 32.7 years old. The inhaled or smoked mode was the most used by drug users. The adjusted hepatitis B and hepatitis C prevalence among study participants were 11.1% and 2.3% respectively. The marital status (p = 0.001), and the nationality (p = 0.011) were significantly associated with hepatitis B infection. The type of drug used was not significantly associated with hepatitis B infection or hepatitis C infection. **Conclusion:** The prevalence of HBsAg and anti-HCV antibodies among DUs

are comparable to those reported in the general population in Burkina Faso. This result suggests that the main routes of contamination by HBV and HCV among DUs are similar to those in the population, and could be explained by the low use of the injectable route by DUs in Burkina Faso.

Keywords

Drug Users, Hepatitis C, Hepatitis B, Prevalence, Burkina Faso

1. Introduction

Hepatitis B and C constitute a worldwide public health problem, representing a significant cause of morbidity and mortality, especially in Africa and Asia [1]. It is estimated that 2 billion and 170 million people have been infected by HBV and HCV, respectively, in the world. About 15% - 40% of patients with chronic hepatitis B virus can progress to liver cirrhosis, liver failure, and hepatocellular carcinoma [2]. In general, 80% (about 71.1 million people) of hepatitis C-infected individuals develop chronic HCV, of which 10% - 15% will develop liver cirrhosis [3]. In Burkina Faso, the seroprevalence is estimated at 9.1% for the hepatitis B surface antigen and 3.6% for hepatitis C virus antibodies [4]. The country is classified as highly endemic for hepatitis B and low-intermediate for hepatitis C [5] [6].

The transmission of HBV and HCV occurs, mainly, through direct contact with blood, intravenous injections and transfusion of contaminated blood and/or blood products, and unprotected sex, the latter associated with HBV transmission [7]. Even though there are effective vaccine and antiviral therapies for HBV infection that make the elimination of HBV possible, there is a lot to do, especially in low-income countries [8]. In the case of HCV, in addition to the absence of an effective vaccines, the presence of diversified genotypes, drug-resistant variants, occult HCV infection, and other cost and awareness-related factors make its elimination difficult [9]. For the elimination of HBV and HCV to be possible, it is crucial to work hard on awareness raising, to test, and to vaccinate people in high-risk groups, including drug users [10].

Intravenous drug use is well known in the transmission of blood borne diseases including hepatitis in many countries [11] [12], however, it is lightly documented in sub-Saharan Africa, particularly in West Africa [13] [14]. This is because the mode of consumption is considered to be infrequent [15]. If these forms of non-injecting drug consumption seem to eliminate the risk of transmission of viral hepatitis through the possible sharing of contaminated needles, the fact remains that drug consumption in any form whatsoever could promote behaviors and sexual risks such as early first sexual intercourse, inconsistent condom use, and multiple sexual partners [16] [17]. Additionally, drug users may engage in the sex trade to obtain supplies, putting them at increased risk of sexually transmitted infections (STIs) [18].

However, data on drug consumption in Burkina Faso is rare and published studies on HBV and HCV in drug users are lacking. So, the prevalence assessment of HBV and HCV among drug users is important for designing further HBV and HCV prevention and control interventions. Therefore, the current study aimed to describe seroprevalence and associated factors of hepatitis B and C viral infection among drugs users in Burkina Faso.

2. Materials and Methods

2.1. Study Design and Location

This was a cross-sectional biological and behavioral survey conducted between June and August 2022, among drug users in Ouagadougou and Bobo Dioulasso, the two main cities of Burkina Faso.

2.2. Study Population

The study involved drug users aged 18 years or older. The inclusion criteria were: 1) having used drugs in the past six months, 2) having lived in the target city at least the past 3 months, 3) having provided written and informed consent, 4) had a valid peer recruitment coupon and 5) agreed to complete a behavioral survey. We excluded individuals who were visibly intoxicated, or those with severe mental illness preventing participation in informed consent procedures. The sample size calculation was done as previously described [19].

2.3. Sampling and Recruitment Process

We used respondent-driven sampling (RDS) to recruit drug users. We recruited three initial drug users as seeds in Ouagadougou and three others as seeds in Bobo Dioulasso. After giving informed consent, seeds were required to complete the survey and have their blood sampled. Three coded coupons were given to each seed to recruit three new participants. The coded coupon was valid for 2 weeks. The seeds were encouraged to recruit up to three other drug users from their social networks. Each additional participant was also asked to recruit up to three different individuals from their social network with coded study coupons. This process continued until we reached sample size in each city. Each participant was reimbursed 3000 CFA francs (equivalent to US$ 6) for their time and expenses related to transport to and from the study site, and 2000 CFA francs (equivalent to US$ 4) for every peer they recruited into the study.

2.4. Data Collection Tools and Procedures

The behavioral survey was conducted by a face-to-face interview in a private room. Participant information was anonymized and identified with a unique code number to protect confidentiality. The questionnaire was digitized and data were collected on tablets using the CSPro application. The questionnaire was administered in French or the local language (Mooré, Dioula) depending on the language spoken by the participant. After providing written informed consent,

participants completed the questionnaire. The topics of the questionnaire were: sociodemographic characteristics; drug use habits; sexual behavior; exposure to interventions and knowledge about HIV.

2.5. Biological Specimen Collection and Testing

After completing the behavioral survey, participants were offered hepatitis B surface antigen (HBsAg) and hepatitis C virus antibodies testing (Anti-HCV). For this, venous blood was drawn by a trained lab technician. After centrifugation of the blood sample, plasma was used for the different tests. For HBsAg test, we used "SD-Bioline HBsAg" on site. Anti-HCV test was performed later with "MONOLISA anti-HVC Plus" in the "Institut de Recherche en Sciences de la Santé (IRSS)" Laboratory in Ouagadougou.

2.6. Data Analysis

Data were entered and analyzed using Stata 17. The data cleaning has consisted of a linking of biological data and behavioral data. Participants without biological or behavioral data were excluded from the analysis. The sample weight was calculated using RDAnalyst. Then this weight was merged with biological and behavioral data to make the analysis using Stata 17. The prevalence of HBsAg and anti-HCV carriage was determined by calculating the ratio of positives cases of HBsAg or ant-HCV and all tested drug users. All results were weighted since the recruitment was done using RDS approach. Differences in the HBV and HCV seroprevalence between subgroups were compared using the Chi-square test. All statistical test was considered significant when p value < 0.05.

2.7. Ethics Approval

This study was approved by the Ethics Committee for Health Research of Burkina Faso with "deliberation number: 2020-02-029", and All participants provided written informed consent. All staff working with participants were trained on the importance of maintaining confidentiality, and signed confidentiality agreements before involvement in the study. The participants' anonymity was respected by using a unique identification code throughout the study process.

3. Results

A total of 323 drug users were recruited including 6 seeds with 3 seeds in Ouagadougou which recruited 173 participants and 3 seeds in Bobo Dioulasso which recruited 150 participants.

3.1. Sociodemographic Characteristics of Drug Users

The study population consisted of 315 men, *i.e.*, 97.5% of the total. The mean age of participants was 32.7 ± 10.96 years. The 18 - 25 age group accounted for 27.2%. We have noted that 83.6% of the drug users surveyed had at least a school education (educated), the majority were single (75.9%) and had a job (76.8%).

Burkinabe nationality accounted for 97.2% of participants (Table 1).

3.2. Behavioral Characteristics Related to Drug Use Patterns

One hundred and thirty-two (132) participants, or 40.9%, used the drug for the first time before the age of 18 years. The majority of DUs used cannabis (80.5%), followed by heroin (51.7%), cocaine and crack (41.8%). Only 5 DUs (1.6%) used benzodiazepines. The inhaled or smoked mode was the most used by our study population. This mode of consumption is 100% for those who use cannabis, 97.6% for heroin, 97.4% for crack, 71.2% for cocaine, and 40.0% for benzodiazepines. Only one person (0.6%) injected heroin. DUs used daily heroin in 80.8% of cases, cannabis in 67.0% of cases, crack in 44.4% of cases, cocaine in 40.7% of cases, and benzodiazepines in 40.0% of cases.

3.3. Seroprevalence of HBsAg and Anti-HCV Carriage

The adjusted hepatitis B and hepatitis C prevalence among study population were 11.1% and 2.3% respectively. Table 2 shows a prevalence of 10.9% in Ouagadougou and 11.8% in Bobo Dioulasso for HBV and a prevalence of 2.5% in

Table 1. Socio-demographic characteristics of participants (n = 323).

Variable	Effective (n)	Percentage (%)
Sex		
Male	315	97.5
Female	8	2.5
Age		
[18 to 25 years[	88	27..2
≥25 years	235	72..8
Formal education		
Educated	270	83.6
Non-educated	53	16.4
Marital status		
Never married	245	75.9
Married/partnered	59	18.3
Separated/divorced/widowed	19	5.9
Occupation		
Worker	248	76.8
Unemployed	75	23.2
Country of origin		
Burkina Faso	314	97.2
Other countries	9	2.8

Ouagadougou and 1.9% in Bobo Dioulasso for HCV.

3.4. HBsAg and Anti-HCV Carriage According to Sociodemographic Characteristics

Regarding hepatitis B, age, sex, education level, and occupation were not significantly associated with hepatitis B infection, but marital status and nationality were significantly associated with hepatitis B infection. For hepatitis C, we did not find any sociodemographic characteristics significantly associated with HCV infection (Table 3).

Table 2. Seroprevalence of HBsAg and Anti-HCV carriage in Ouagadougou and Bobo Dioulasso.

Residence	Drug users n	HBsAg positive		Anti-HCV positive	
		% Adjusted	95% CI	% Adjusted	95% CI
Ouagadougou	173	10.9	[5.8 - 19.4]	2.5	[0.93 - 6.37]
Bobo Dioulasso	150	11.8	[5.5 - 20.0]	1.9	[0.37 - 8.87]
Total	323	11.1	[6.9 - 17.4]	2.3	[1.0 - 5.2]

Table 3. Distribution of HBsAg and Anti-HCV carriage according to sociodemographic characteristics.

Variable	Effective N	HBsAg positive %	IC95%	P-value	Anti-HCV positive %	IC95%	P-value
Sex				0.739			0.590
Male	315	11.21	[6.9 - 17.6]		2.2	[0.9 - 5.2]	
Female	8	8.2	[1.2 - 38.9]		4.3	[0.4 - 32.7]	
Age				0.605			0.794
[18 to 25 years[	88	9.01	[3.5 - 20.9]		1.9	[0.3 - 9.9]	
≥ 25 years	235	11.82	[6.8 - 19.6]		2.4	[0.9 - 6.1]	
Formal education				0.442			0.169
None	53	18.01	[5.6 - 44.6]		4.6	[0.7 - 23.1]	
Primary	103	15.13	[6.4 - 31.5]		2.6	[0.6 - 9.9]	
Secondary	143	7.36	[3.7 - 13.8]		0.6	[0.1 - 2.3]	
University	24	10.33	[2.5 - 33.7]		6.5	[1.2 - 27.5]	
Occupation				0.194			0.886
Student/pupil	23	3.12	[0.4 - 19.9]		1.6	[0.2 - 11.0]	
Workers	248	13.54	[8.1 - 21.7]		2.2	[0.8 - 5.7]	
Unemployed	52	6.39	[1.7 - 20.7]		2.9	[0.4 - 18.2]	
Marital status				0.001			-
Never married	245	7.92	[4.7 - 13.0]		2.8	[1.1 - 6.6]	

Continued

Married/partnered	59	9.05	[3.1 - 23.6]		1.3	[0.1 - 9.5]	
Separated/divorced/ widowed	19	42.2	[14.9 - 75.1]		0	-	
Country of origin				0.011			0.581
Burkina Faso	314	9.8	[6.1 - 15.3]		2.2	[0.9 - 5.3]	
Other countries	9	50.9	[12.0 - 88.7]		4.2	[0.4 - 29.5]	

Table 4. Distribution of HBsAg and Anti-HCV carriage according to drug consumption habits.

Variable	Effective N	HBsAg positive %	IC95%	P-value	Anti-HCV positive %	IC95%	P-value
Heroin				0.675			0.795
Yes	167	11.8	[6.2 - 21.1]		2.5	[0.8 - 06.9]	
No	156	9.8	[5.4 - 17.2]		2.0	[0.5 - 7.0]	
Cocaine				0.927			0.874
Yes	59	11.7	[3.1 - 34.6]		2.5	[0.7 - 8.0]	
No	264	10.9	[6.6 - 17.5]		2.2	[0.8 - 6.0]	
Crack				0.545			0.142
Yes	115	9.4	[4.7 - 17.7]		3.9	[1.3 - 10.7]	
No	208	12.3	[6.5 - 21.9]		1.2	[0.3 - 4.2]	
Cannabis				0.386			0.249
Yes	260	12.0	[7.1 - 19.6]		1.7	[0.5 - 5.0]	
No	63	7.6	[2.8 - 18.6]		4.5	[1.2 - 15.4]	
Benzodiazepine				0.536			0.803
Yes	5	0	-		0	-	
No	318	11.17	[6.9 - 17.4]		2.3	[1 - 5.2]	

3.5. HBsAg and Anti-HCV Carriage According to Drug Consumption Habits

The type of drug used was not significantly associated with hepatitis B infection or hepatitis C infection (Table 4).

3.6. HBsAg and Anti-HCV Carriage According to Sexual Behavior

As shown in Table 5, none of the sexual behaviors, namely first sexual intercourse before the age of 15, the number of regular sexual partners, having paying sexual partners, being a man having sexual relations with another man, the fact of using a condom at last sexual intercourse was not significantly associated with hepatitis B or hepatitis C infection.

Table 5. Distribution of HBsAg and Anti-HCV carriage according to sexual behavior.

Variable	Effective N	HBsAg positive %	IC95%	P-value	Anti-HCV positive %	IC95%	P-value
1st sexual intercourse <15 years				0.962			0.584
Yes	47	9.6	[2.7 - 28.0]		3.5	[0.8 - 13.7]	
No	273	9.9	[5.9 - 15.8]		2.2	[0.8 - 5.6]	
Regular sexual partner				0.796			0.346
0 sexual partner	135	10.6	[5.2 - 20.2]		1.5	[0.2 - 7.0]	
1 sexual partner	145	12.3	[6.0 - 23.4]		3.6	[1.3 - 9.3]	
≥2 sexual partners	43	7.9	[2.6 - 21.1]		0.8	[0.1 - 5.8]	
Paying sex partner				-			0.066
0 Paying sex partner	293	11.12	[6.7 - 17.7]		2.1	[0.8 - 5.2]	
1 Paying sex partner	7	0	-		18.9	[2.7 - 66.3]	
≥2 Paying sex partners	23	12.74%	[3.1 - 39.5]		4.0	[0.5 - 24.3]	
A man, who had sex with another man				-			0.539
Yes	4	0	-		5.05	[0.3 - 43.3]	
No	311	11.28	[6.9 - 17.7]		2.22	[0.9 - 5.3]	
Use of condom at last sexual intercourse				0.755			0.269
Yes	116	9.8	[3.5 - 24.5]		1.12	[0.2 - 4.5]	
No	207	11.7	[6.8 - 19.1]		2.83	[1.0 - 7.1]	

4. Discussion

This study investigated the seroprevalence and risk factors for hepatitis B, and hepatitis C infections among DUs in Burkina Faso. The HBsAg, and HCV prevalence rates were 11.1% and 2.3% respectively.

For hepatitis B, the prevalence of 11.1% confirms the endemic situation [5] of this virus in the country. This endemic situation has already been reported by Meda *et al.*, in 2018 with a prevalence of 9.1% in the general population [4]. Other studies of hepatitis B seroprevalence in specific groups other than DUs report similar prevalences. Sawadogo *et al.*, reported an HBV prevalence of 11.2% among health care personnel at the Souro Sanou University Hospital in Bobo-Dioulasso in 2015 [20]. Linguani *et al.*, in a systematic review and meta-analysis of epidemiological studies from 1996 to 2017, report the prevalence of HBV of 9.41%, 11.11%, 11.73% and 12.61% in the general population, pregnant women, blood donors and HIV-positive people, respectively [21]. Considering these data and the confidence intervals of the HBV prevalence, DUs appear to have the same risk of contracting HBV as the general population. This could be explained by the fact that the main routes of transmission of HBV in sub-Saharan Africa are those from mother to child, during early childhood and

sexual routes [22]. However, the prevalence is higher in other specific groups such as MSM with 20.4% [23] and sex workers with 18.2% [24]. Moreover, studies among DUs in other countries corroborate our analyses. Lepretre *et al.*, in Dakar (Senegal) in 2015, demonstrated a prevalence of 7.9% among IDUs, which was very similar to the prevalence in the general population at the time of the study [13]. This same trend was found by Tun *et al.*, in Lagos (Nigeria) in 2013 [25] who found prevalences of 7.8% among IDUs corresponding to those of the general population. In the present study, HBV was significantly associated with marital status (p = 0.0019) and nationality of participants (p = 0.0119). Wu J. *et al.* in Guangdong (China) also found in a univariate analysis a significant link between HBV and being divorced or separated [26]. The small number of parenteral drug users did not make it possible to establish an association with the risks associated with injection.

Regarding hepatitis C, the prevalence of 2.3% was relatively low but is within the low-intermediate range [6]. The low prevalence found in the present study could be explained by the prevalence in the general population which was 3.6% in 2018 [4], but also by the low proportion of injecting drug users found in the study population, knowing that the parenteral route is the highest risk about HCV infection. This prevalence is high compared to that found by Tao *et al.* in 2014 on a sample of participants who took a voluntary hepatitis screening test in Burkina Faso, where anti-HCV antibodies were found in 1% of cases [27]. Demissie *et al.*, through a similar study among IDUs in Addis Ababa (Ethiopia) corroborate our results with a prevalence of 2.9% [28].

Similar studies in other regions of the world report much higher prevalences among DUs. Leprêtre *et al.*, in Dakar (Senegal) in 2009, found a prevalence of 23.8% [13]. In their study, injecting drugs use was significantly associated with HCV infection with a prevalence of 38.85% among injecting users compared to 18% for those who had never injected drugs. In the present study, only one participant reported injecting drugs. The parenteral route is the highest risk in HCV transmission and could explain the relatively low prevalence of HCV. Kpelly *et al.*, in Togo in 2022 [29] and Tun *et al.*, in Lagos (Nigeria) in 2010 [25] corroborate our analysis through studies of HCV prevalence in injecting drug users (IDU) populations with high prevalences of 53% and 7.7% respectively among IDU.

No sociodemographic characteristic was significantly associated with HCV. Our results are similar to those found by Tun *et al.*, in Nigeria who also did not find sociodemographic factors associated with this infection [25]. Other studies, however, have found sociodemographic factors significantly associated with HCV infection. Lepretre *et al.*, in Dakar (Senegal), found that marital status had a significant link with HCV infection [13]. Wu *et al.*, in Guangdong (China) reported that low monthly income was a risk factor for HCV infection. The factors associated with HCV were age, history of incarceration and tattooing among non-injecting drug users in Argentina [30]. No link had also been established between sexual risks and those linked to injections. The low proportion of in-

jecting drug users who participated in this study could explain the absence of risks.

This study has certain limitations. Self-declaration of risky behaviors and the clandestine context of drug consumption may have led to incorrect responses which are sources of bias. However, this had no impact on the prevalence of hepatitis B and C. Therefore, the current study provides data on hepatitis B and C infections among DUs in Burkina Faso, West Africa.

5. Conclusion

Drug consumption in our country turns out to be a common practice with a preference for non-injectable routes. However, measures remain necessary to prevent the generalization of the use of the injectable route. The prevalences of hepatitis B and C that we found among DUs are close to the data for the general population and efforts must be made to maintain this trend. Appropriate screening strategies, targeted educational programs, adequate HBV vaccination and HCV treatment are of extreme importance in the fight against these infections among DUs. Our study only concerned the DUs of the two main cities (Ouagadougou and Bobo-Dioulasso). A study taking into account all the major cities in the country would make it possible to carry out a global analysis of the risks of infection among Dus in the country.

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Authors' Contributions

SZ, HGO, KC, OK-Z: Study design and implementation. KS, OK-Z, DK, ST, FS, IS: Data collection and supervision. SZ, HGO: Biological laboratory tests. KC, DK, HGO: Data analysis and interpretation. SZ, HGO, KC, OK-Z: Manuscript drafting. CK-T, SD, DZ, AO, CDAH, MS, SK: Correction of manuscript. All authors have reviewed and approved the final version of the manuscript.

Conflicts of Interest

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

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