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Prevalence of Hepatitis B among Students from the University of Lomé, Togo in 2015

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Abstract

Objective: Hepatitis B virus (HBV) is endemic in sub-Saharan Africa where more than 80 million subjects are chronic carriers. However, screening is not systematic in the population and prevalence data are scarce, especially among the youth population. The objective of this study was to estimate the prevalence of HBV and its correlates among first-year University students at the University of Lomé. **Study design:** A cross-sectional survey was conducted between November 2015 and January 2016 at the University of Lomé during the annual checkup offered to newly enrolled students. **Method**: A self-administered questionnaire was used to collect data on demographics and sexual behaviors, and rapid tests were used for the detection of Antigen HB_S (HBsAg) and HIV in each participant. A logistic regression model was performed to identify factors associated with HBsAg positivity. **Results:** A total of 800 students (56.2% were men) were screened among 1505 students who participated in the study. The median age was 20 years (IQR: [18 - 21]). The overall prevalence of HBsAg was 4.6% (95% CI: [3.2 - 6.3]): 5.8% among men and 3.1% among women (p = 0.04). The prevalence of HIV was 0.8; 95%CI [0.3% - 1.6%] and one case (0.1%) of coinfection HIV and HBV was identified. Factors associated with HBsAg positivity were male gender [adjusted Odds Ratio (aOR) = 2.08, 95% CI: 1.02 - 5.00, p = 0.0447] and ever having a sexual relationship [aOR = 2.44; 95% CI = 1.11 - 5.78, p= 0.0264]. **Conclusion:** This study among university students demonstrates that the prevalence of HBV is high among this population and that there is a need for prevention programs to target this vulnerable population. This is an additional argument

toward HBV screening and treatment among students during annual health check.

Keywords

Hepatitis B, Prevalence, West-Africa, Students

1. Introduction

The World Health Organization (WHO) estimates at more than 2 billion the number of people infected with the Hepatitis B Virus (HBV) in the World [1]. An estimated 240 million people are chronic carriers of HBV, making HBV infection the tenth leading cause of death. More than 600,000 people die every year from complications of hepatitis B [1]. Liver cancer is the worst consequence of HBV infection and is the second leading cause of deaths due to cancer in the World [1] [2] [3]. Sub-Saharan Africa (SSA) has the highest prevalence of Hepatitis B with 80 million people carriers of HBV [4] and a prevalence ranging from 5% to 10% in the adult population [1]. Despite HBV prevalence being relatively high in SSA, screening and treatment is still limited or rare in this region [5].

In SSA, HBV is most commonly transmitted from mother-to child at birth (perinatal transmission) or through horizontal transmission (exposure to infected blood), especially from an infected child to an uninfected child during the first 5 years of life [1] [6] [7] [8] [9]. Sexual transmission of HBV, which is scarcely documented, could also occur among healthy adults particularly when unvaccinated people engage in risky sexual behaviors [1]. The main complication of HBV infection is the occurrence of hepatic cirrhosis that lead to hepatocellular carcinoma especially when transmission occurs before the age of 5 [10] [11] [12]. To avoid HBV transmission during childhood, the HBV vaccine was introduced in the expanded program on immunization (EPI) in several countries of SSA in the years 2000. In Togo, the HBV vaccine was introduced into the National EPI in 2008.

Very few data on the prevalence of HBV in the general population exist in Togo. One study conducted among people living with HIV in 2011 estimated the HBV prevalence at 9.7% [4]. Another study among prisoners in 2013 estimated the prevalence at 12.5%, while a study among individuals in a hospital in Lomé found a prevalence as high as 19.1% [5] [13]. However, no study in Togo has so far specifically focused on the prevalence of HBV among youth and university students, who could be considered a vulnerable population. The objective of this study was to estimate the prevalence of HBV and to determine its associated factors among first-year students of the University of Lomé, in Togo.

2. Method

2.1. Study Design

Across-sectional survey was conducted among first-year students enrolled at the

University of Lomé, during the academic year 2015-2016. The participants were enrolled from November 23, 2015, to January 29, 2016 in the Division of Preventive Medicine of the University of Lomé.

2.2. Study Population and Sampling

The study population was students in their first year presenting themselves for their mandatory health check-up. A consecutive recruitment occurred during this period of data collection. We included all students coming from preventive medicine for their check-up from November 2015 to January 2016. Among them, we randomly selected 800 for biological tests of HBV and HIV. Inclusion criteria were: 1) to be student in the first year, 2) attending check-up visit, ii) signing a consent form to participate in the study. The criteria of non-inclusion was the refusal to participate in the study.

2.3. Data Collection

A self-administered questionnaire was provided to each participant, to collect data on socio-demographic characteristics, consumption of addictive substances, and sexual behaviors. Participants took 10 to 15 minutes to complete it. Prior to the beginning of the study, the questionnaire was tested on 20 students to ensure questions were appropriate and to reformulate as needed.

2.4. Biological Analyses

The rapid test Determine HBsAg® (Alere determined™ HBsAg, Waltham, MA, USA) was used for the measurement of HBs Antigen. It is a dipstick test for the qualitative detection of HBsAg and has a sensitivity of 85% and a specificity of 100% [14]. HIV screening is based on the recommended national algorithm Determine HIV-1/2 (Abbott Diagnostics) and First Response HIV Card test 1 - 2.0 (PMC Medical). A student was considered as living with HIV when both tests were positive. In case of no concordance of the two tests, the blood sample was sent to the national reference laboratory for an ELISA test.

2.5. Data Processing

The data from the questionnaire were entered and stored in a Microsoft Office Access 2007 database. Prior to analysis, all data were checked and cleared. The statistical analysis was performed with R software version 3.3.2. Statistical analysis included a descriptive analysis of students who had their HBsAg results available and a comparative analysis based on HBsAg positivity. Descriptive analysis consisted of frequencies and proportions, or median and interquartile range (IQR). A comparative analysis was also conducted to assess the difference between variables collected depending on the availability of the HBsAg results. The statistical tests used was the Mann Whitney/Wilcoxon test for the quantitative variables. Univariate and multivariate logistic regression were conducted to assess risk factors associated with HbsAg positivity. Explanatory variables were:

sex, age, location (urban or rural setting) financial status, education level, history of sexual intercourse, alcohol consumption. The threshold of significance was set at 0.05. Missing data were not taken into account in the analyses.

2.6. Ethical Aspects

Ethical approval was granted on November 2015 by the Bioethics Committee for Research in Health in Togo (No. 513/2015/MSPS/CAB/SG/DPLET/CBRS). An information sheet and informed consent form were provided to each student to explain the purpose of the study and to obtain their agreement to participate. Each student was considered as included in the study once they signed the consent form. The anonymity of the students participating in the study was maintained and an identification number was assigned to each respondent. The data collected was stored in a secure location and the database was protected from access with passwords.

3. Results

3.1. Sociodemographic Characteristics

During the study period, 1505 students came for their annual health check. For financial reason, 800 blood samples were randomly selected for Hepatitis B including 56.2% of males (n = 450) and 43.8% of females (n = 350). There was no statistical difference between the students included in the study and those not included for the main demographic and behavioral variables. The median age was 20 years old (IQR: [18 - 21]). Almost all students were single (99.1%), 60.5% students lived in urban areas and 2.4% reported smoking. Approximately half of students (47.7%) reported ever having sexual intercourse and among them the number of partners reported the last 12 months was one IQR [1 - 1]. This number was similar in men and women.

The other sociodemographic characteristics are presented in **Table 1**.

3.2. Prevalence of HBV

Out of 800 students tested for HBV, 37 were identified as being HBsAg-positive with a prevalence of 4.6% (95% CI [3.2% - 6.3%]). This prevalence was higher in males (5.8%) than in females (3.1%), although the difference was not statistically significant (p = 0.07). The prevalence of HBsAg was unevenly distributed among the different age groups and was lower among those less than 18 years old (1.3%) compared to those aged between 18 and 20 (6.9%) and those 20 years old and older (5.3%; p = 0.01) (**Table 2**). There was no significant association between the consumption of addictive substances and being HBsAg positive (**Table 2**). Hepatitis B prevalence was 5.7% in participants who ever had sexual intercourse vs 2.7% among students who were not yet sexually active (p = 0.037).

3.3. HBV and HIV Coinfection

A total of six students were HIV positive with a prevalence of 0.8% 95 CI [0.3% -

Table 1. Sociodemographic characteristics (N = 800).

Characteristics	n	%
Sex (n = 800)		
Male	450	56.2
Female	350	43.8
Age (years) (n = 800)		
<18	101	12.6
18 - 20	399	49.9
21 - 23	228	28.5
>23	72	9.0
Marital status (n = 796))		
Married/cohabiting	3	0.4
Single	789	99.1
Divorced/Widowed	4	0.5
Educational level of head of family (n = 778)		
Primary school	82	10.5
Secondary school	327	42.0
University/College	236	30.3
Never went to school	35	4.5
Don't know	98	12.6
Living setting (n = 782)		
Urban	473	60.5
Semi-Urban	163	20.8
Rural	146	18.7
Perception of financial status (n = 770)		
Comfortable/Sufficient income	473	61.4
Poor or very poor	297	38.6
Ever had sexual intercourse (n = 774)		
Yes	369	47.7
No	405	52.3
Smoking (n = 787)		
Rarely	19	2.4
Never	768	97.6
Alcohol Consumption (n = 780)		
Several times/week	3	0.4
Several times/month	6	0.8
Rarely	342	43.8
Never	429	55.0
Drugs (n = 780))		
Several times/month	1	0.1
Rarely	6	0.8
Never	773	99.1

Table 2. Description of socio-demographic characteristics based on AgHBs positivity.

Characteristics	Total (n = 800)		AgHBs+ (n = 37)		AgHBs− (n = 763)		P value
	N = 800	n (%)	*N* = 37	n (%)	*N* = 763	n (%)	
Sex	*N* = 800						0.0784
Male		450 (56.3)		26 (70.3)		424 (55.6)	
Female		350 (43.7)		11 (29.7)		339 (44.4)	
Age (years). median	*N* = 800		*N* = 37		*N* = 763		0.0152
Median [IQR]		20 [18-21]		20 [20-22]		20[18-21]	
Age (years). quartile	*N* = 800		*N* = 37		*N* = 763		0.0093
≤18		238 (29.8)		3 (8.1)		235 (30.8)	
[18 - 20]		262 (32.7)		18 (48.7)		244 (32.0)	
[20 - 21]		102 (12.8)		6 (16.2)		96 (12.6)	
[21 - 31]		198 (24.7)		10 (27.0)		188 (26.6)	
Marital Status	*N* = 796		*N* = 37		*N* = 759		0.2843
Married/Cohabitating		3 (0.4)		0 (0.0)		3 (0.4)	
Single		789 (99.1)		36 (97.3)		753 (99.2)	
Widowed/Divorced/Separated		4 (0.5)		1 (2.7)		3 (0.4)	
Living setting/Place of origin	*N* = 782		*N* = 35		*N* = 747		0.0488
Urban		473 (60.5)		18 (51.4)		455 (60.9)	
Semi-urban		163 (20.8)		5 (14.3)		158 (21.2)	
Rural		146 (18.7)		12 (34.3)		134 (17.9)	
Perception of Financial status	*N* = 770		*N* = 36		*N* = 734		0.0391
Comfortable		176 (22.9)		6 (16.7)		170 (23.2)	
Sufficient income		297 (38.6)		9 (25.0)		288 (39.2)	
Poor		271 (35.2)		21 (58.3)		250 (34.1)	
Very poor		26 (3.3)		0 (0.0)		26 (3.5)	
Tobacco consumption	*N* = 787		*N* = 35		*N* = 752		0.2121
Everyday		-		-		-	
Several times/week		-		-		-	
Several times/month		-		-		-	
Rarely		19 (2.4)		0 (0.0)		19 (2.5)	
Never		768 (97.6)		35 (100.0)		733 (97.5)	
Alcohol consumption	*N* = 780		*N* = 35		*N* = 745		0.9999
Everyday		-		-		-	
Several times/week		3 (0.4)		0 (0.0)		3 (0.4)	
Several times/month		6 (0.8)		0 (0.0)		6 (0.8)	
Rarely		342 (43.8)		15 (42.9)		327 (43.9)	
Never		429 (55.0)		20 (57.1)		409 (54.9)	
Drugs consumption	*N* = 780		*N* = 35		*N* = 745		0.9999
Everyday		-		-		-	
Several times/week		-		-		-	
Several times/month		1 (0.1)		0 (0.0)		1 (0.1)	
Rarely		6 (0.8)		0 (0.0)		6 (0.8)	
Never		773 (99.1)		35 (100.0)		738 (99.1)	

1.6%]). There is one (0.1%) case of coinfection of HBV and HIV.

3.4. Factors Associated with the Positivity of HBsAg

In multivariate analysis, two variables were associated with HBsAg positivity: male gender (aOR = 2.08, 95% CI [1.02 - 5.00], p = 0.0047) and ever having a sexual relationship (aOR = 2.44; 95% CI [1.11 - 5.78]), p = 0.0264) (Table 3).

4. Discussion

This is the first study of hepatitis B prevalence study among university students in Togo which yielded aHBV prevalence of 4.6%. Two factors were significantly associated with HbsAg: gender and ever having sexual intercourse.

Previous studies in Togo reported a HBV prevalence ranging approximately between 9% to 19% [4] [5] [13]. These studies were mainly conducted among specific group of people with different characteristics in terms of age, sexual activity, matrimonial status, morbidity, etc. It is therefore difficult to compare the

Table 3. Factors associated to AgHBs+ among University students of the University of Lome. Univariate and Multivariate analysis (n = 770).

Characteristics	Univariate Analysis					Final Model (Multivariate analysis)		
	n/N	%	OR	95%CI	P values	AOR	C95%CI	P values
Sex, n = 800					0.0829			0.0447
Females	11/350	3.1	1.00			1.00		
Males	26/450	5.8	1.89	[0.94 - 4.04]		2.08	[1.02 - 5.00]	
Age (years). Median, n = 800					0.0077			
[16 - 18]	3/238	1.3	1.00					
[18 - 31]	34/562	6.1	5.04	[1.79 - 21.10]				
Living setting. n = 782					0.0727			0.2054
Urban	18/473	3.8	1.00			1.00		
Semi-urban	5/163	3.1	0.80	[0.26 - 2.04]		0.73	[0.23 - 1.95]	
Rural	12/146	8.2	2.26	[1.04 - 4.77]		1.43	[0.58 - 3.39]	
Educational level of head of family, n = 778					0.9014			
Primary school/never went to school/Don't know	9/215	4.2	1.00					
Secondary	15/327	4.6	1.10	[0.48 - 2.66]				
University	12/236	5.1	1.23	[0.51 - 3.06]				
Alcohol consumption. n = 780					0.7943			
Never	20/429	4.7	1.00					
Several times/week or month/Rarely	15/351	4.3	0.91	[0.45 - 1.80]				
Ever had sexual intercourse, n = 774					0.0422			0.0264
No	11/405	2.7	1.00			1.00		
Yes	21/369	5.7	2.16	[1.05 - 4.71]		2.44	[1.11 - 5.78]	

OR: Odds Ratio, AOR: Adjusted Odds Ratio; 95% CI: 95% Confidence Interval; N: Denominator in the population and n numerator (number of subject with HBgAs+).

prevalence of those previous studies with the prevalence among University students in Lomé. Some studies in SSA showed a comparable HBV prevalence among youth [15] [16]. A study conducted at the University of Bangui among 801 students in 2007 found a prevalence of HbsAg positivity of 1.3% [17]. Mboto and Edet [18] found a similar prevalence of 4.7% among 150 students at the University of Uyo, Nigeria. In another study completed from 2011 to 2014 in The Gambia, a prevalence of 3.1% was found among male blood donors between the ages of 16 and 19 [19]. In addition, the data from the PROLIFICA study indicates that the prevalence of HBsAg positivity increased with age among men from the blood bank and men from the community to reach a peak between 30 and 39 years old then decline after this age [20]. In our study, a similar trend was observed with a higher prevalence among students older than 18 compared to those 18 years old and younger (6.1% versus 1.3%).

Other studies have reported that this high rate of infection with hepatitis B among youth could be attributed to riskysexual behaviors such as multiple sexual partners, tattoos and piercings, although the difference was marginally significant [17]. In our study, we did not collect data on tattoos and piercing to document an association with hepatitis B.

The prevalence of HBV was on average twice as high among young people who ever had sexual intercourse. The role of sexual transmission in Hepatitis B infection is less explored. A study conducted in South Korea reported that in non-vaccinated populations, sexual transmission may increase the prevalence of HBV infection among adolescents (OR = 1.8; CI 95%: 1.1 - 2.8) and youth 18 to 20 years old (OR = 1.90; CI 95% = [1.01 - 3.57]) [20]. Another study in Uganda reported that having 3 or more lifetime partners was significantly associated with HBV infection among an adult population [21]. Hence, sexual transmission of HBV is not negligible and cohort studies should be initiated to understand the impact of sexual transmission in HBV infection.

Many studies have already reported a higher prevalence of HBV in men compared to women [13] [20] [21]. In Lemoine's study, the prevalence of hepatitis B among men was 10.5% compared to 7.6% among women ($p = 0.004$). Similar results were reported in our study with the prevalence of HBV higher among men than women ($p = 0.08$). The reasons for this difference in the prevalence of HBV by gender is not widely known. One explanation could be the earlier sexual debut and amore frequent sexual activity among boys [22].

In SSA, access to antiviral drugs, including tenofovir and entecavir that are the most potent drugs for HBV viral suppression, is restricted to HIV-infected individuals [23]. Hence, the only possibility is to vaccinate children against HBV with a vaccine that is only usable after the sixth week. However, perinatal transmission is major in countries of West Africa [1] [24] [25]. The screening of pregnant women could be the start point for the screening of families, in case of a positive result.

One of the limitations of our study is the use of a single positive Antigen HBs instead of two results spaced within six months to detect a chronic carrier of an-

tigenemia HBs. Another limitation is the use of an anonymous survey which did not allow for tracking of records, especially transfer across other health centers to estimate the eligibility for antiviral treatment. The PROLIFICA study estimates that 5% of chronic carriers were eligible for antiviral treatment [19]. Finally, the HBV viral load was not performed to estimate occult hepatitis whose prevalence in Africa varies between 10% and 88% [26] [27]. Therefore, the prevalence of HBV in this population could probably be underestimated especially when the sensitivity of the rapid test for HBVvaries between 86% - 96% [28].

This study led to the inclusion of HbsAg screening into students' annual health check (package) and to reinforce advocacy for more access to HBV treatment in Togo as well as vaccination of children at birth. In addition, a nationwide HBV prevalence evaluation study is necessary in the short term by taking into account the date of introduction of the Hepatitis B vaccine in the EPI in order to estimate the prevalence of HBV in Togo and evaluate the impact of this vaccine. Monitoring data in the general population is also required for epidemiological tracking of this pandemic. Some Asian countries see the prevalence of HBV and the hepatocellular carcinoma decrease due to vast children's immunization programs. Unfortunately, this is not the case in SSA where halting perinatal transmission could be a realisticgoal [25] [28].

5. Conclusion

In conclusion, we reported high prevalence of hepatitis B among students at the University of Lome, and a relationship between sexual activity and HBV infection. Therefore, immediate and appropriate interventions should be designed and implemented across African University campuses. These actions, including awareness of safe sexual behaviors, access and availability of condoms and a reduction of the cost of immunization could contribute to reduce the transmission of HBV among young students.

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Statement

The authors have no conflict interest to declare.

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