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## RESEARCH ARTICLE

# High Prevalence of Hepatitis B Virus Infection in the Age Range of 20-39 Years Old Individuals in Lome

Malewe Kolou<sup>1,2,\*</sup>, Gnatoulma Katawa<sup>3</sup>, Mounerou Salou<sup>2</sup>, Komlan Selom Gozo-Akakpo<sup>3</sup>, Sika Dossim<sup>2</sup>, Alexander Kwarteng<sup>4</sup> and Mireille Prince-David<sup>2</sup>

<sup>1</sup>Centre Hospitalier Universitaire (CHU) Campus, Lome, Togo

<sup>2</sup>Faculte des Sciences de la Santé (FSS), Universite de Lome, Togo

<sup>3</sup>Ecole Superieure des Techniques Biologiques et Alimentaires (ESTBA), Universite de Lome, Togo

<sup>4</sup>Institute of Medical Microbiology, Immunology and Parasitology (IMMIP), University Hospital of Bonn, Germany

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### Abstract:

#### Background:

Hepatitis B is a liver infection caused by the hepatitis B virus (HBV). It affects all women and men irrespective of age. Although sub-Saharan Africa is an area of high prevalence of this disease, data on the prevalence of acute and chronic HBV infections in this region remain to be widely documented.

#### Objective:

This study aimed to investigate the prevalence of HBV in relation to age in Centre Hospitalier Universitaire Campus (CHU-C), one of the two teaching hospitals of Lome, Togo.

#### Method:

The present study is a cross-sectional study about the prevalence of hepatitis B surface antigen (HBsAg) carriage from 2009 to 2011. All study participants were screened for HBsAg at the Immunology laboratory of CHU Campus of Lome.

#### Results:

One thousand two hundred individuals were screened for HBsAg from 2009-2011. The overall prevalence of HBV infection was 19.08%. This prevalence was significantly higher in men (25.00%) than women (14.80%). The highest prevalence of HBV was observed in age range of 20-29 years and 30-39 years with respectively 26.33% and 21.67%. The lowest prevalence was 6.08%, found in people over 50 years. Concerning the clinical indication of the test, the prevalence during the clinical abnormalities related to liver (CARL) was the highest (26.21%), followed by the systematic screening (SS) with 20.25% while the pre-operative assessment (POA) showed the lowest prevalence with 5.56%.

#### Conclusion:

The study shows the high prevalence of HBsAg carriage in young people. This could be used to enhance prevention and treatment of HBV infection in Togo.

**Keywords:** Age range, HBs antigen, Hepatitis B virus, Prevalence, Togo.

\* Address correspondence to this author at the CHU Campus Faculte des Sciences de la Santé, Universite de Lome; Agoe Logope 13 BP 378 Lome, Togo; Tel: +228 90106600; E-mails: [koloumalewe@hotmail.fr](mailto:koloumalewe@hotmail.fr), [koloumalewe@gmail.com](mailto:koloumalewe@gmail.com)

## INTRODUCTION

Hepatitis B is a major public health problem [1, 2]. According to WHO, the number of infected people is estimated to 2 billion worldwide of which 240 million people are reported to be chronically infected by hepatitis B virus (HBV). There are about 65 million individuals who carry HBV in Africa, with a 25% mortality risk. In sub-Saharan Africa, the prevalence of HBV infection ranges from 9-20% [3, 4]. This high prevalence is derived from epidemiological data which remain insufficient in this part of Africa.

Chronic HBV carrying can lead to complications like hepatocellular carcinoma (HCC) or cirrhosis, or both [5]. HBV infection is one of the major causes of death related to cirrhosis and liver cancer [6]. Some of the challenges with HBV infection are diagnosis and management [7]. Vaccination is known to have significantly reduced mortality due to HBV infection [8].

The diagnosis of viral hepatitis B is based on the interpretation of several serological and virological markers. Screening for virus surface antigen (HBsAg) is the most common approach in detecting the infection. HBsAg is reliably present in the acute phase of the infection and its persistence beyond 6 months indicates chronic phase. On the other hand, the e antigen of hepatitis B (HBeAg) shows that the virus is multiplying rapidly with an increased risk of transmission [9].

The efficacy of the vaccine against HBV has been exploited especially in areas where children are most affected with risk of chronicity [10]. In sub-saharan Africa, various data show horizontal transmission in infants. This mode of transmission is not clearly understood but some studies suggested percutaneous infection through saliva or blood and using of contaminated needles and tribal scarification [3]. The evolution of HBV infection in sub-Saharan Africa is not well known.

Therefore, there is the need for empirical data, which reflect the situation in Africa to inform WHO since current guidelines are based on studies in Europe and Asia [11]. Towards this end, the present study aimed to assess the prevalence of HBV infection at CHU-C of Lome.

## MATERIALS AND METHODS

### Study Population and Sample Design

This cross-sectional study assessed the prevalence of HBV infection from 2009-2011 at CHU-C of Lome. Participants of the study included individuals screened for HBsAg at the Immunology laboratory of CHU-C of Lome. In total, 1,200 individuals comprised of male and female were tested for HBsAg carriage during the study period. Biodata such as gender, age and clinical indications of participants were carefully documented. Patients were grouped as follows: 0-9 years, 10-29 years, 30-39 years, 40-49 years and  $\geq 50$  years. Each clinical indication of the HBsAg tracking was included in one of the six following groups: the Clinical Abnormalities Related with the Liver (CARL), the Clinical Abnormalities Not Related with the Liver (CANRL), the Biological Abnormalities (BA), the Pre-Natal Assessment (PNA), the Pre-Operative Assessment (POA) and the Systematic Screening (SS). Systematic screening means people who were tested without any symptom, or those with symptoms but these were not related to hepatitis B infection. The details of each group of indications are listed under Table 2. Data were collected from January to December during each of the three years.

### Assessment of HBV Infection in Study Participants

To determine HBV infection in the study participants, HBsAg test was performed using AxSYM HBsAg (Abbott Diagnostics, Chicago, USA). It is a micro particulate fluorescence immunoassay for the qualitative detection of HBV surface antigen in the human serum or plasma.

### Statistical Analysis

Data were entered into Microsoft Excel (2007) and statistical analysis performed using Epi-Info 7 and SPSS statistics 17.0 software. Univariate comparisons between categorical variables were carried out using the Pearson Chi-Square-test or Fisher's Exact test as appropriate. A p-value less than 0.05 was used to indicate statistical significance.

## RESULTS

### Study Population Characteristics

In total, 1200 individuals were screened. Regarding gender distribution, there was no statistical difference found between female and male. Interestingly, we observed higher number of individuals in the ranges of 20-29 and 30-39 years compared to those of other ranges as shown in Table 1. In all, the children and adolescents (0-19 years) had the least number among the age groups screened for HBV infection. Such observations suggest that the drive for one to go for HBsAg screening could be influenced by some factors. Furthermore, the number of individuals screened steadily decreased during the study period.

**Table 1. Demographic characteristics of the studied population.**

	Female n(%)	Male n(%)	Total n(%)
0-9ans	33(2.75)	34(2.83)	67(5.58)
10-19ans	50(4.17)	39(3.25)	89(7.42)
20-29ans	254(21.17)	122(10.17)	376(31.34)
30-39ans	195(16.25)	128(10.67)	323(26.92)
40-49ans	79(6.58)	85(7.08)	164(13.66)
50 et plus	85(7.08)	96(8.00)	181(15.08)
<b>Total</b>	<b>696(58.00)</b>	<b>504(42.00)</b>	<b>1200(100)</b>

Mean age = 33,17 ± 14,89 years (minimum = 0, maximum = 91years).

### Elevated Number of Systematic Screening Individuals

To assess the factors which influence HBV infection among the study population, we grouped the study participants according to the clinical indications. Clinical indications were classified under six groups (CARL, CANRL, BA, SS, PNA and POA) which have been already explained in the materials and methods section. In Table 2, we showed that the proportion of individuals systematically screened for HBsAg were significantly higher (59.25%) compared to the other groups. Interestingly, the proportions of PNA (12.50%) and CARL (12.08%) were also elevated compared to BA (8.00%), CANRL (6.67%) and POA (1.50%).

**Table 2. The reasons for the screening of HBsAg.**

	Number of individuals	Percentage
SS	711	59,25
PNA	150	12,50
CARL	145	12,08
BA	96	8,00
CANRL	80	6,67
POA	18	1,50
<b>Total</b>	<b>1200</b>	<b>100,00</b>

SS (Systematic Screening) means that the subject screened had no symptom or there was another reason such as health check, prenuptial review, medical fitness, blood exposure accident and review for sexual abuse. PNA (Pre-Natal Assessment) is related to the monitoring of pregnancy. CARL (Clinical Abnormalities Related with the Liver) include edema and ascites syndrome, pain in the right upper quadrant of the abdomen, icterus, hepatomegaly, suspected hepatitis, liver cirrhosis. BA (Biological Abnormalities) include cholestasis syndrome, cytolysis syndrome, liver disorder, decrease in liver function, pancytopenia, myelosuppression. CANRL (Clinical Abnormalities Not Related with the Liver) include infectious syndrome, asthenia, hyperthermia, nephrotic syndrom, spinal pain, sickle cell disease, chronic renal failure on dialysis, hypotension, gastroduodenal reflux and, atrioventricular communication. POA (Pre-Operative Assessment) concerns the screening of HBsAg performed before surgery.

### Prevalence of Hepatitis B Virus Infection Within the Study Population

We next evaluated the prevalence of HBV infection within the study population by screening HBsAg. Out of the 1,200 individuals screened, 229 were positive, corresponding to a prevalence of 19.08%. The prevalence of infected male individuals (25.00%) was higher than that of infected female individuals (14.80%) (Table 3). No statistical difference regarding the prevalence of the infection from 2009 to 2011 was observed (Table 3).

Furthermore, the prevalence of the infection in CARL (26.21%) and SS (20.25%) groups was higher than other groups and higher than the overall prevalence (19.08%). Although lower than the overall prevalence, the prevalence of the carriage of HBsAg was relatively high in the BA (18.75%) and CANRL (15.00%). More interestingly, the

percentage of infected pregnant women (10.67%) was considerably higher than that of individuals screened for POA (Table 3).

**Table 3. Prevalence of HBsAg by year, gender, age group and clinical indications.**

		HBsAg(+) n(%)	HBsAg(-) n(%)	Row total n(%)	Chi-Square tests
Year	2009	132 (19.97)	529 (80.03)	661 (100)	Pearson $\chi^2$ -test=0.949 p=0.622
	2010	75 (18.43)	332 (81.57)	407 (100)	
	2011	22 (16.67)	110 (80.92)	132 (100)	
Gender	Male	126 (25.00)	378 (75.00)	504 (100)	Pearson $\chi^2$ -test=19.700 p=0.000
	Female	103 (14.80)	593 (85.20)	696 (100)	
Age (years)	0-9	8(11,94)	59(88,06)	67(100)	Pearson $\chi^2$ -test=39.782 p=0.000
	10-19	10(11,24)	79(88,76)	89(100)	
	20-29	99(26,33)	277(73,67)	376(100)	
	30-39	70(21,67)	253(78,33)	323(100)	
	40-49	31(18,90)	133(81,10)	164(100)	
	>50	11(6,08)	170(93,92)	181(100)	
Reason of HBsAg screening	CARL	38(26,21)	107(73,79)	145(100)	Pearson $\chi^2$ -test =15.281 p=0.0092 Fisher's Exact Test = 15.330 p=0.008
	SS	144(20,25)	567(79,75)	711(100)	
	BA	18(18,75)	78(81,25)	96(100)	
	CANRL	12(15)	68(85)	80(100)	
	PNA	16(10,67)	134(89,33)	150(100)	
	POA	1(5,56)	17(94,44)	18(100)	

CARL: Clinical Abnormalities Related with the Liver; CANRL: Clinical Abnormalities Not Related with the Liver; BA: Biological Abnormalities; SS: Systematic Screening; PNA: Pre-Natal Assessment; POA: Pre-Operative Assessment.

### High Prevalence of HBV Infection in 20-39 Years Old Individuals

In this study, we aimed to investigate the prevalence of the infection according to the age range. Interestingly, we found that individuals aged 20-29 and 30-39 years were more infected than the other groups with respectively 26.33% and 21.67%. The lowest prevalence (6.08%) was found among those aged 50 and over (Table 3).

## DISCUSSION

The present study aimed to evaluate the prevalence of HBV infection among individuals tested from 2009 to 2011 in CHU-C of Lome, Togo. During this period, 1,200 individuals were screened for HBV infection through HBsAg detection. Of these, majority were females, a finding which is consistent with recent studies by Navarro, N. *et al* [12]. This could be due to the 12.5% of women screened under the monitoring of pregnancy (PNA). Indeed, it is observed that female proportions were higher than that of men in the age ranges of 20-29 and 30-39 years. These two age ranges correspond to women of childbearing age. We found that more than half of the study population (58.26%) was represented by young adults (20-39 years). So, they were more represented than the children and adolescents under 20 years (13.0%) and also than people  $\geq 40$  years (28.74%). This makes sense since 20-39 years age range individuals represent an active workforce which forms a large proportion of the total population of Togo. In this group, we also observed higher number of pregnant women being screened for HBV infection. With regard to clinical indications for the HBsAg tracking, the number of individuals tested during a Systematic Screening (SS) was higher than other clinical indications. Pre-Natal assessment and clinical abnormalities related with the liver were also higher than the rest. As SS means people without symptoms or people with symptoms that are not related to the liver disease, we can explain the high number of this category of population by the awareness of the medical staff about hepatitis B infection. Due to this awareness, the screening of HBsAg is offered to the majority of those who are received in medical consultation even if they do not present any particular risk. We observed that the number of people tested decreased from 2009 to 2011. Many reasons could explain this finding. For example, there has been an awareness in the Togolese population about HBV infection after the implementation of a childhood vaccination program in 2007. Before this time, the vaccination against HBV was not available for all the children. As CHU-C is hosting a vaccination center, parents who bring their children for vaccination also want to be vaccinated. Thus, the medical staff of the vaccination center recommends the screening of HBsAg prior to vaccination. Moreover, the year 2010 was an election year in Togo with some decline in general business. Nevertheless, this last reason does not explain the decrease in 2011.

Worldwide, 2 billion people are known to be infected with hepatitis B virus [13]. However, data on the prevalence of chronic viral hepatitis B are varied. In some countries in Asian and Western Pacific, the prevalence of HBV infection has been estimated to exceed 10% whereas less than 0.5% has been documented in the United States and Northern Europe [14]. In sub-Saharan Africa, carrier rates range from 9-20% [3]. The mean prevalence in our study population is 19.08%. This observed prevalence may not reflect the national prevalence since the study was carried in hospital area. In addition, CHU-C where the study took place is the only reference center for hepato-gastroenterology in Togo and the prevalence seen may be higher than the national prevalence because of referred patients. In HIV infected people, the prevalence of HBV infection ranges from 9.7-12.5% [15 - 17]. However, higher prevalence was found in specific risk groups such as sickle cell disease patients (20.2%) [18] and health care workers (36-56%) [19]. Although the number of females tested was higher compared to males, the prevalence of infected male individuals exceeded that of the female. Xia *et al.* found considerable variations in the prevalence of HBsAg carrier in different regions and gender in China [20]. Moreover, the prevalence among first generation Koreans in the U.S is higher in men than women [13]. In contrast with the decrease number of people being tested from 2009 to 2011, no difference was observed concerning the prevalence of infected people among the years. This was not expected because of the global engagement for vaccination against HBV [11, 21]. Furthermore, in Taipei City, the carriage of HBsAg reduced from 9.8% before the vaccination to 0.6% in children after 20 years of vaccination [22]. In US, acute hepatitis B incidence declined, from 8.5 cases per 100,000 populations in 1990 to 1.5 cases per 100,000 populations in 2007, the lowest rate ever recorded [23]. We expected that with the recent childhood vaccination program implemented in 2007 in Togo, the prevalence of HBV infection would have decreased. Later studies may be warranted to evaluate the impact of the vaccination program on the prevalence of HBV infection in Togo.

Since the number of tested individuals was higher in the age range of 20-39 years, we next investigated the prevalence of HBV infection among the different age groups. Interestingly, individuals with age range from 20-39 years old were more infected than the children and adolescent and also than older population ( $p < 0.05$ ). The main reason of these differences could be the sexual transmission of HBV. Sexual transmission was shown to be involved in HBV contamination [13, 14]. The same trend was observed in Romanian adult population (18-69 years) during 2006-2008 [24]. So some people in the 20-39 years old, individuals may present with acute hepatitis that will heal spontaneously. Thus, it is likely that older subjects have cleared the virus, explaining the low prevalence in people over 50 years. Another hypothesis to explain the low prevalence observed beyond 50 years is the death of carriers of the virus because of complications. This will therefore result in a reduction of the life expectancy of infected people. Likewise, in the study of McMahon *et al.*, the prevalence of patients with symptomatic hepatitis increased with age, ranging from 9.5% in those aged under or equal to four years to 33.3% over 30 years [25]. The same trend was observed in the USA and in Greenland [26, 27]. Furthermore, Xia *et al.* reported that HBV infection was significantly increased with age in China [20].

Other reasons have been advanced to explain the high prevalence in adults than children. It has been suggested that African children are infected at birth, but for some genetic reasons, the tests remain negative for many years before the virus reactivates [3]. The diagnosis of HBV used here is based on the detection of HBsAg which appears early after the contamination and disappears some few months later [28]. In Western countries, viral hepatitis B is relatively less frequent and contamination usually occurs at adult age, while in Asia and Africa, chronic hepatitis B is more common and acquired in the childhood or perinatally [1].

In our study, we observed that individuals with clinical abnormalities related with the liver (CARL) are more infected by HBV. HBV was found to be one of the main reasons of developing hepatocellular carcinoma [8, 11, 29]. It has been demonstrated that HBV and hepatitis C virus (HCV) can persist as chronic infections and then they can lead to chronic liver disease and hepatocellular carcinoma in the United States [8, 23]. Out of CARL, Systematic Screening (SS) tracked more infected individuals than other reason for being tested. This suggests that the prevalence of HBsAg is very high in the general population so that SS could be a good way for tracking infected people as the infection is most of the time asymptomatic. It seems increasingly important to screen the entire population because since about one year, tenofovir became available and accessible to patients in Togo.

## CONCLUSION

Taken together, this cross-sectional study on the prevalence of HBV infection highlighted the age range as well as the best method of tracking HBV infection in Togo. The findings presented will be valuable to epidemiologists and national health workers in the prevention and treatment of HBV infection. Furthermore, we recommend systematic

screening of HBV in Togo and other countries in the sub-Saharan Africa in order to throw more lights on the epidemiology of HBV in these regions.

### CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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