

Epidemiological and Serological Profile of Hepatitis B Virus in an Urban Area in Mali

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Abstract

The objective of our study was to evaluate hepatitis B virus (HBV) infection in an urban population. This longitudinal study was conducted in Bamako District and Kati Commune. After a preparatory phase, the persons who accepted the protocol were assessed for HBsAg. HBsAg carriers had blood collection for HBeAg assay, viral load assessment, genotyping, DNA mutation testing, and severity of hepatic fibrosis and necrosis. At the end of this study, 1475 persons were included, of which 195 had HBsAg positive confirmed, that is to say 13.97%. The mean age of HBsAg positive patients was 35.11 ± 11.12 years with a sex ratio of 2.68. HBeAg was found in 8.9% of the patients tested for this antigen. The viral load was undetectable in 10.52% of patients and greater than 2000 IU/mL in 32.24% of cases. Fibrosis \geq F2 and necrosis \geq A2 were found in respectively 19.72% and 6.80% of cases. Genotype E was found in 91.6 patients and an R249S mutation observed in 39.04% of cases. **Conclusion:** HBV infection has a serious impact on socio-economic development in Mali because it affects mainly the young male population, hence the need to organize preventive measures effectively.

Keywords

Hepatitis B Virus, Epidemiology, Serology, Bamako, Kati

1. Introduction

Hepatitis B virus (HBV) infection is an important global public health problem. In fact 240 million people, that is to say 5% of the world population, are chronic HBV carriers with a million of annual deaths [1] [2] [3] [4]. This mortality is

commonly caused par cirrhosis and hepatocellular carcinoma (HCC). Unfortunately, there is now no treatment able to have the virus clearance. The best and most effective way to fight with the virus remains the universal vaccination of newborn children, which has shown in some asian countries.

Despite the cosmopolite character of this infection, it is more frequent in tropical areas specially in sub-Saharan countries [1] [2].

In Mali, in an anterior study, at least one blood marker of HBV was found in 97.2% of subjects tested for this virus [3]. In a recent study, the prevalence of HBs Antigen was 14.7% of the studied population [4]. On the other hand, Antigen HBs (HBsAg) was found in 15.5% of pregnant women and 43.2% of children born of the HBsAg positive women were also HBsAg positive after nine months of follow-up. In this age chronic carriage is very common [5] [6]. The involvement of hepatitis B virus in chronic liver disease has been demonstrated in our context by the presence of HBsAg in 55% to 71% in cirrhosis and 55% - 66.2% in hepatocellular carcinoma [7] [8] [9]. We undertook this study in some social groups of the district of Bamako and the city of Kati, in order to reevaluate the HBV infection epidemiological, after awareness campaigns and starting of vaccination against this HBV.

2. Patients and Methods

The longitudinal study, conducted in the district of Bamako and the city of Kati (Bamako border town), focused on any voluntary for HBV screening among medical students, health personnel, security agents and the general population. We included in the study was any person with HBV unknown status. According to the prevalence of this infection in the previous studies we selected in hazard 1500 persons.

A preparatory phase allowed the general population to be informed about the purpose and the course of the study.

After this step, blood samples were taken to be technically tested at the Biomérieux laboratory in Bamako and at the same time a simple questionnaire was administered about socio-demographic data and exposure to risk factors for transmission of the virus. HBsAg assay was performed on each sample taken by a rapid test of Roche laboratory: Best One Step HBsAg Test Disk. On the 1500 samples, 25 are used to validate the kits and finally 1475 samples are definitively used for the study.

Samples revealed to be positive for HBsAg were then subjected to a confirmatory ELISA test of the Biomérieux laboratory: VIDAS HBs kit.

Confirmed carriers of HBsAg were reviewed for a second specimen for HBe antigen (HBeAg) at the Biomérieux laboratory in Bamako. Viral load, genotypes of the virus, DNA R249. Sutation and the evaluation of the hepatic impacted by Fibrotest/Actitest were performed at the BIOMNIS laboratory of Lyon (France).

Patients consent was obtained and the results were confidential. Non HBsAg positive people were informed and provided with the necessary information on the prevention of infection and the availability of doctors for any solicitation.

For HBsAg positive patients a treatment was proposed in case of indication, otherwise a regular follow-up was recommended.

Data were collected on a survey card and analyzed in the Epi Info software (version 6.0). We used the Chi² test to compare our results which were considered significant for a probability $p < 0.05$.

3. Results

At the end of the study, 195 patients were HbsAg positive in a population of 1475 tested with a prevalence of 13.97%.

The mean age of patients was 35.11 ± 11.12 years with extremes of 15 and 72 years and 81.6% of patients were under 45 years of age.

The sex ratio (m/f) was 2.68.

No exposure to a major risk factor was found save for the status of health personnel.

HBeAg was present in 8.9% of patients tested for this antigen (8/90).

A viral load greater than 2000 IU/mL was found in 32.2% of patients (**Table 1**).

Among eight HBeAg positive patients, seven had a viral load greater than 2000 IU/mL ($p = 0.00045$).

Moderate to severe fibrosis ($F \geq 2$) was found in 19.7% of patients and necrosis was significant ($A \geq 2$) in 6.8% of patients (**Table 2**). Fibrosis and necrosis were significantly associated ($p = 0.0006$). A viral load greater than 2000 IU/mL was associated with moderate to severe fibrosis in 24.4% of cases (**Table 3**). There was no relationship between viral load and degree of liver fibrosis (Spearman correlation $p: 0.33$).

Table 1. Patient distribution according to HBV viral load.

Viral load (IU/mL)	Number	Percentage %
Undetectable	16	10.6
≤ 2000	87	5.2
> 2000	49	32.2
Total	152	100

Table 2. Scores of fibrosis and activity at actitest.

Fibrotest®	Number (%)	Actitest	Number (%)
F0	69 (46.9)	A0	84 (57.1)
F0 - F1	20 (13.6)	A0 - A1	38 (25.9)
F1	6 (4.1)	A1	10 (6.8)
F1 - F2	23 (15.7)	A1 - A2	5 (3.4)
F2	10 (6.8)	A2	5 (3.4)
F3	11 (7.5)	A3	5 (3.4)
F4	8 (5.4)		
Total	147 (100)	Total	147 (100)

Table 3. Patient distribution according to fibrotest and viral load.

Viral load (IU/mL) Fibrotest®	≤2000 n (%)	>2000 n (%)	Total
F0	43 (45.7%)	20 (44.4%)	63
F0 - F1	14 (14.9%)	5 (11.1%)	19
F1	3 (3.2%)	3 (6.6%)	6
F1 + F2	17 (18.1%)	6 (13.3%)	23
F2	4 (4.3%)	6 (13.3%)	10
F3	6 (6.4%)	4 (8.9%)	10
F4	7 (7.4%)	1 (2.2%)	8
Total	94	45	139

Genotype performed among 90 patients: genotype E was found in 82/90 patients (91.1%). One genotype E was associated with a genotype D in 5/90 patients (5.6%).

DNA R249S mutation was found in 41/105 patients (39.05%).

4. Discussion

This longitudinal study reported the epidemiological and serological profile of the hepatitis B virus in the Bamako District (Gabriel Touré and point “G” Teaching Hospitals, security agents, students) and in the city of Kati (Kati Hospital).

The main limit of this study is that some people did not come for the confirmation test it is why the tables are not the same total. The exams were done on best conditions. The course of the study respected all ethical aspects.

HbsAg prevalence at 13.97% in this study confirms the data from previous studies about this virus in Mali ranging our country into the highly endemic area for this infection [1] [2] [3] [4]. This prevalence is considerable because it is estimated that 15% to 40% of carriers of the hepatitis B virus will have a complication related to this infection during their lifetime [10]. It is comparable to those of Diallo [11], Guindo [12] and Tangara [13] who found respectively rates of 12.1%, 14.9%, and 15.72%.

The absence of any exposure to the blood in this youth population suggests horizontal or vertical contamination in childhood. Newborn vaccination at birth had thus an interest because of the frequent passage to chronicity in case of contamination at this age.

The particularity of this infection is its high frequency in man (72.8% of the sample) and the young subject accounted for 81.6%. This high representativeness of young people has already been reported by previous studies in both rural and urban areas [4] [14]. The socio-economic impact of this infection is thus demonstrated because it affects the most productive social group.

HBe antigen was found in 8.9% of the subjects tested for this antigen and a

viremia greater than 2000 IU/mL was reported in 32.2% of 152 people who had the viral load assay. Despite these relatively low levels of replication markers, hepatitis B virus infection should always be a concern because of the potentially daunting complications however the status of the infection.

Moderate to severe fibrosis and significant necrosis were observed in 19.7% and 6.8% of cases, respectively. These states predispose to complications. In our region, several studies have reported the association of hepatitis B virus with cirrhosis [8] [9] [15] [16]. The carcinogenic role of the hepatitis B virus is proven in Africa, as several studies have reported its association with HCC [10] [15] [17].

The strong representation of genotype E is consistent with literature data on genotype E predominant in West Africa. The frequency of the DNA mutation of R249S in our context of high theoretical aflatoxin consumption could explain the important prevalence of HCC.

5. Conclusion

Hepatitis B virus infection is a real public health problem in Mali. It has a serious impact on socio-economic development, mainly affecting the young male population. Preventive measures against this virus, in particular, a routine birth vaccination policy, are needed to reduce its prevalence and thus the incidence of cirrhosis and HCC in our context.

Conflicts of Interest

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

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Questionnaire

Patient identity

Surname: _____ Name: _____
 Gender: _____ Age: _____
 Profession: _____ Adresse: _____
 Numéro de Tel: _____

Antecedents

Transfusion Jaundice
 Tattoo Other expositions Yes No

If yes specify:

Virus markers: HBs Ag _____ HBe Ag _____ Viral load _____
 Genotype: _____ ADN mutation _____
 Aminotransferase;
 ALAT: _____ ASAT: _____

Fibrosis and necrosis staging