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Study of Serological Profiles and Co-infections in Ag HBS-positive Patients Received at the Bacteriology-Virology Laboratory of the Fann University Hospital Centre in 2024

Aïssatou Ahmet NIANG [1,2*], Youssoupha FALL[1], Madiagne DER[1], Amadou DIOP[2,4], Fatoumata DIALLO[1,2], Baidy DIEYE[2,4], Habibou SARR[3], Abdoulaye BA[6], Roughyatou KA[5], and Mouhamadou Lamine DIA[1,2]

[1]*Bacteriology -Virology Laboratory, National University Center of Fann, Dakar-Senegal.*

[2]*Bacteriology -Virology Laboratory, Faculty of Medecine, Pharmacy and Odontology, Cheikh Anta DIOP University of Dakar, Senegal.*

[3]*UFR in Health Sciences, University of Ziguinchor, Senegal.*

[4]*Bacteriology-Virology Laboratory of Albert Royer National Children's Hospital Center, Dakar, Senegal.*

[5]*UFR in Health Sciences, University of Thies, Senegal.*

[6]*Food and Agriculture Organization of the United Nations, Senegal.*

[*]Correspondence:
Aïssatou Ahmet NIANG, PharmD, Msc, Bacteriology-Virology Laboratory, National University Center of Fann, Faculty of Medecine, Pharmacy and Odontology, Cheikh Anta DIOP University of Dakar, Senegal., Phone: +221 77 501 37 15.

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ABSTRACT

Introduction: *Viral hepatitis, particularly hepatitis B, is a major public health problem due to its high transmissibility and severe complications. Chronic hepatitis B carries a significant risk of fibrosis, cirrhosis and hepatocellular carcinoma, requiring rigorous biological monitoring based on serological markers. This study aims to describe the serological profiles of HBsAgpositive patients admitted to the Fann University Hospital Centre in 2024 and to assess the frequency of co-infections, particularly HBV/HCV.*

Methodology: *This was a prospective, descriptive and analytical study conducted at the Fann University Hospital over a one-year period from1January 2024 to 31 December 2024. All HBVpositive patients seen for follow-up during the study period were included. Data were collected from records and test reports and entered into Excel. The variables collected were: age, sex, diagnosis, results: HBeAg, anti-HBeAb, total anti-HBcAb, anti-HBc IgM, anti-HCVAb and anti-HBsAb. Data analysis was performed using Excel software. Descriptive analysis was performed using Epi Info 7®software.*

Results: *A total of 388 patients were included, 53% of whom were men, giving a male-tofemale ratio of 1.13. The average age of the patients was 37, ranging from 1 to 105 years. The 30-39 age group was the most represented (33.77%). The prevalence of HBeAg was 3.09%, the majority of whom were male (75%) and belonged to the 20-39 age group (58.33%). No patients had anti-HBc IgM. Anti-HCV antibodies were detected in 0.75% of carriers.*

Conclusion: *Despite the low prevalence of HBeAg and the absence of anti-HBc IgM, chronic HBV carriage remains a concern due to the risk of transmission and serious complications. These complications include cirrhosis and hepatocellular carcinoma. The results highlight the importance of strengthening awareness, screening, biological monitoring and vaccination.*

Keywords
Study, Markers, Carriers, Hepatitis B, Co-infection, Hepatitis C.

Introduction
Viral hepatitis is a major global public health problem. Among the different types of viral hepatitis, hepatitis B (inflammation of the liver caused by the hepatitis B virus (HBV)) is particularly significant due to its high transmissibility and its potential to develop into cirrhosis and hepatocellular carcinoma [1]. According to the World Health Organisation (WHO), nearly 296 million people were living with chronic hepatitis B virus (HBV) infection in 2019, resulting in more than 820,000 deaths each year, mainly

due to chronic complications [2]. In Africa, 65 million people are chronic carriers of HBV, with the highest endemicity found in sub-Saharan Africa, where the prevalence of HBs antigen (HBsAg) is greater than 8% [1,3].

The severity of chronic hepatitis B lies in the high risk of progression to liver fibrosis followed by cirrhosis and then liver cancer in the absence of treatment. HBV is responsible for 30% of cases of cirrhosis and 53% of cases of hepatocellular carcinoma (HCC) [4,5].

The diagnosis and monitoring of infected patients is based primarily on the analysis of HBV serological markers, which are used to determine the stage of infection, viral activity and immune response [6].

The HBs antigen (HBsAg) is the key marker of infection, while other markers such as HBeAg, anti-HBe antibodies, anti-HBc antibodies (total and IgM) and anti-HBs antibodies are used to establish a complete serological profile [7]. The combination of these markers is essential for distinguishing between acute infection, active chronicity, inactive carriage, and immunity acquired through recovery or vaccination.

Furthermore, co-infections, particularly with the hepatitis C virus (HCV), represent an aggravating factor. HBV/HCV co-infection is associated with faster progression to liver fibrosis, more complex viral replication and an altered therapeutic response [8]. In African countries, where risk factors are often shared (invasive care, old transfusions, traditional practices), co-infection is a particular concern.

In Senegal, hepatitis B remains endemic, with an HBsAg prevalence estimated at between 8% and 12% in several hospital studies [9].

The Fann University Hospital Centre (CHNU), the national reference centre for infectious diseases, receives many patients for screening, monitoring and follow-up examinations. However, few recent studies have described in detail the complete serological profile of HBsAg-positive patients received by the laboratory, or the frequency of associated coinfections.

Therefore, a better understanding of the serological profiles observed in routine practice is an important lever for improving clinical management, biological monitoring and the development of appropriate prevention strategies.

The present study therefore aims to describe the serological profile of HBsAg-positive patients received at the Bacteriology-Virology Laboratory of the Fann University Hospital Centre in 2024, and to assess the prevalence of co-infections, particularly HBV/HCV co-infection, in order to contribute to a better understanding of local epidemiology and the optimisation of care. It is in this context that we conducted this study, the overall objective of which was to evaluate hepatitis B follow-up markers in HBV-positive patients admitted to the LBV at the Fann University Hospital Centre between 1 January 2024 and 31 December 2024.

The specific objectives were to:

- Determine the sociodemographic characteristics (age, sex) of HBsAg-positive patients seen at the laboratory. Analyse the distribution of HBV serological markers.
- Determine the prevalence of HBV/HCV co-infection based on HCV antibody screening.

Methodology

This was a prospective, descriptive and analytical study conducted at the Fann University Hospital over a one-year period from 1 January 2024 to 31 December 2024. All HBV-positive patients seen for follow-up during the study period were included.

Marker levels were measured using the MINI VIDAS® automated system. This is a medical biology automated system designed by bio Mérieux. It is a compact version of the VIDAS® system, widely used for immunoenzymatic analyses based on ELFA (Enzyme Linked Fluorescent Assay) technology, which combines the principles of ELISA with fluorescence detection. Data were collected from records and analysis reports, then entered into Excel. The variables collected were: age, sex, diagnosis, results: HBeAg, anti-HBeAb, total anti-HBcAb, anti-HBc IgM, anti-HCVAb and anti-HBsAb. Data analysis was performed using Excel software. Descriptive analysis was performed using Epi Info 7®software.

Results

During our study period, 388 patients with HBV were received and included. The average age was 37 +/- 9.88. The ages ranged from 1 to 105 years. The majority of patients were in the 3040 age group (Figure 1).

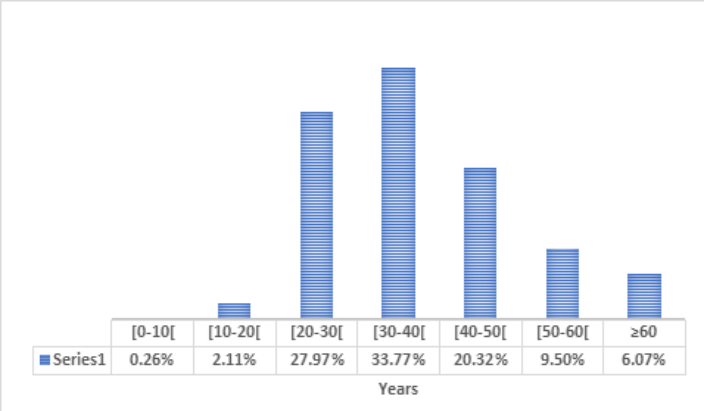

Figure 1: Distribution of HBV patients by age.

In our study, 53% of carriers are male and 47% are female, with a sex ratio of 1.13 (Figure 2).

Of the 388 patients with HBV, only 12 were HBeAg-positive, representing a rate of 3.09% (Table 1).

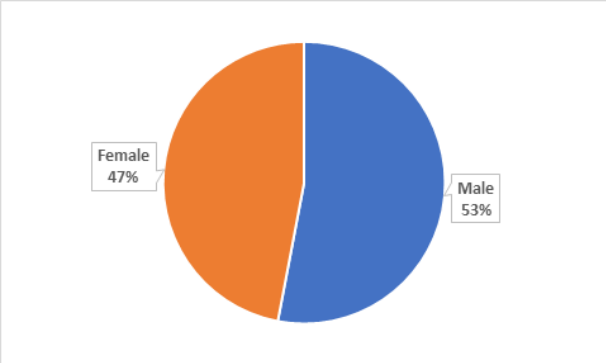

Figure 2: Distribution of HBV carriers by gender.

Table 1: Prevalence of HBeAg in HBV carriers.

Ag HBe	Number	Rate (%)
Positive	12	3,09
Négative	376	96,91
Total	388	100

Among our HBeAg-positive patients, the 20-40 age group is the most represented, accounting for 58.33% (Figure 3).

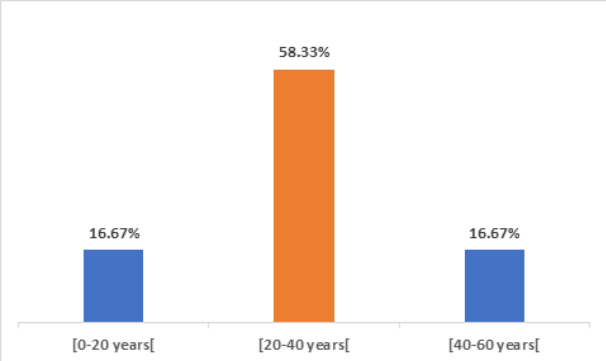

Figure 3: Distribution of HBeAg among HBV carriers by age.

Among our HBeAg-positive patients, males are the most represented, with a rate of 75% (Figure 4).

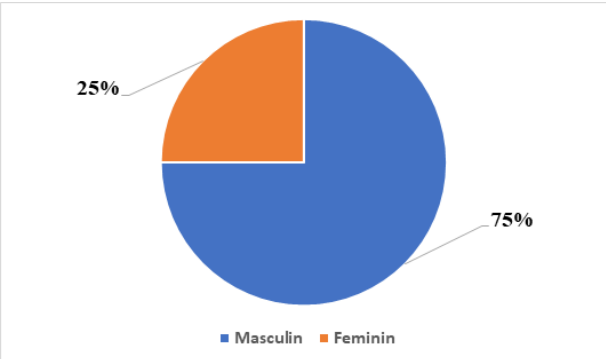

Figure 4: Distribution of HBeAg among HBV carriers by gender.

In our study, none of the carriers expressed anti-HBc IgM (Table 2).

Table 2: Prevalence of anti-HBc IgM in HBV carriers.

IgM anti-HBc	Number	Rate (%)
Positif	0	0
Négatif	388	100
Total	388	100

Only 0.75% of our patients expressed anti-HCV antibodies (Figure 5).

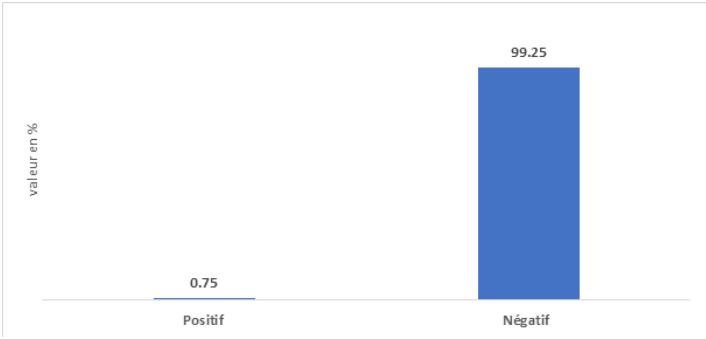

Figure 5: Prevalence of anti-HCV antibodies in patients with HBV.

Discussion

Hepatitis B is a highly contagious viral infection, approximately 10 times more transmissible than hepatitis C and 100 times more than HIV. It is responsible for approximately 1.2 million deaths per year, mainly due to chronic complications such as cirrhosis and hepatocellular carcinoma [3,10]. Hepatitis B remains a major public health problem, particularly in subSaharan Africa, where the prevalence of hepatitis B surface antigen (HBsAg) is often above 8% [5]. In this context, the study conducted at the Fann University Hospital Centre in 2024, which aimed to characterise the serological profile and co-infections in chronic HBV carriers, provides essential local epidemiological data for optimising management and elimination strategies.

Among those infected, 350 million become chronic carriers, representing a significant reservoir for viral transmission [8,11]. The evaluation of serological markers in HBV-infected patients is essential for monitoring the progression of the disease, evaluating the effectiveness of treatments and vaccination, and assessing the response of infected individuals.

The evaluation of serological markers in HBV-infected patients is essential for monitoring disease progression, assessing the efficacy of treatments and vaccination, and evaluating the response of infected individuals. In our study, 388 patients with HBV were included.

Distribution of HBV carriers by age

The average age was 37 years (range 1–105 years). The most represented age group (20-39 years) confirms the predominance of chronic infection in young adults [4].

This profile is typical of regions with high endemicity where perinatal, or early horizontal transmission is the main route leading

to chronic infection that manifests clinically in adulthood [12,13]. The predominance of this age group is particularly concerning as it represents the most socially and sexually active population, highlighting a continuing risk of horizontal transmission [11,14].

These results are consistent with those of a study conducted at the Principal Hospital in Dakar in 2022 on the prevalence of HBe antigen in chronic hepatitis B carriers received at the federation of laboratories of the Principal Hospital in Dakar. This study showed a predominance of the 20-40 age group (73.6%) and a low representation of those under 20 (0.74%). The predominance of young adults could be explained by increased sexual activity and other risk factors for transmission, such as invasive practices or the use of doping substances. The low prevalence among children and adolescents may reflect the proximity of other paediatric facilities, such as the Albert Royer Hospital, and the impact of the introduction of the HBV vaccine into the Expanded Programme on Immunisation (EPI).

Distribution of HBV carriers by gender

Males accounted for 53% of patients, compared with 47% for females. This male predominance could be linked to a more effective immune response in women, hormonal differences and more frequent risk-taking behaviour among men.

The slight male predominance (53%, male-to-female ratio of 1.13) is also consistent with observations made in other African and global studies [15-17].

Although the exact reasons are multifactorial, this difference could be linked to behavioural factors (increased exposure to risk factors) or biological factors, in particular a more effective immune response in women, potentially modulated by sex hormones, which could promote faster viral clearance [18,19].

The impact of the Expanded Programme on Immunisation (EPI) in Senegal, introduced in the 2000s, is beginning to be felt, as evidenced by the low representation of paediatric and adolescent age groups in our cohort [4,16]. However, recent studies show that efforts must be maintained to ensure complete vaccination coverage and lasting seroprotection in children [20,21].

Prevalence of HBeAg in HBV carriers

The prevalence of HBe antigen in HBV carriers was 3.09%. These results are similar to those reported in Congo by Makuwa et al. [12] (3.6%). The prevalence of HBeAg in our cohort is 3.09%, a relatively low rate. This result is 3.09 % consistent with recent data from the sub-region, particularly in the Congo (3.6%) [36] and in Senegal itself, where the majority of chronic carriers are classified as HBeAg-negative [3,4]. These results could be explained by the fact that some patients may be inactive carriers in whom the virus persists but replicates weakly, resulting in reduced or absent HBeAg expression. It may also reflect the effectiveness of antiviral treatments in some patients [22-24].

Distribution of HBeAg among HBV carriers by age

Among our patients expressing HBeAg, the 20-39 age group is the most represented, at 58.33%. These results are similar to those reported by F. Ankouane et al. [11] (66.2%). This predominance could be explained by the fact that, in countries with high endemicity, HBV infections acquired at birth or during childhood often progress to a phase of prolonged immune tolerance. During this phase, the virus replicates actively while the immune system does not yet mount an effective response. This period can last up to 30 or 40 years, which explains the higher prevalence of HBeAg in patients aged 20 to 39.

Distribution of HBeAg in HBV carriers by gender

Our study found that among chronic HBV carriers, the prevalence of HBeAg was much higher in male patients (75%) than in female patients (25%). Our results are consistent with those reported by F. Ankouane et al. [11], who observed similar proportions, i.e. 73.8% in men versus 26.2% in women.

This male predominance could be explained by several factors. On the one hand, men generally have a less robust antiviral immune response than women, in whom oestrogen strengthens innate and adaptive immunity. On the other hand, testosterone has an immunosuppressive effect, which may promote more persistent viral replication. Added to this are more frequent behavioural and environmental exposures in men (alcohol consumption, smoking, drug use, occupational risks), which can aggravate the infection or delay seroconversion. These factors combined contribute to the prolonged persistence of HBeAg in the male population [25].

Prevalence of anti-HBc IgM in HBV-positive patients

In our study, none of the positive patients presented anti-HBc IgM. Anti-HBc IgM are markers of acute infection or recent viral reactivation [24,26].

Their absence suggests that patients are in a stable chronic phase, whether HBeAg-positive or -negative, and not in an acute flare-up phase. This result is comparable to other studies conducted on populations of blood donors or patients undergoing chronic follow-up [27].

This can be explained by the fact that the majority of our patients were in an inactive phase or in a phase of immune tolerance characterised by minimal viral replication and the absence of acute HBV reactivation.

Prevalence of anti-HCV antibodies in HBV carriers

In our study, only 0.75% of HBVpositive patients had anti-HCV antibodies. This rate is low, but it is comparable to the HCV seroprevalence observed in the general population in Senegal [28,29]. Indeed, Cisse Y.'s study on the seroprevalence of hepatitis C virus infection among blood donors in Senegal found a prevalence of 0.25%.

Although rare, HBV/HCV co-infection is clinically significant. It is associated with faster progression of liver fibrosis, an increased

risk of cirrhosis and HCC, and more complex therapeutic management [30-32]. Monitoring this co-infection therefore remains essential, especially since the risk factors for transmission invasive care, traditional practices, transfusion) are often shared across the subregion [33,34]. Recent studies on co-infections in West Africa show variable prevalence, but still highlight the need for systematic screening for both viruses [26,29].

Conclusion

Hepatitis B remains a major global public health problem today, despite the existence of a safe and effective vaccine. The serious complications associated with it, particularly cirrhosis and hepatocellular carcinoma, highlight the importance of regular monitoring of serological and virological markers to assess the progression of the disease, adapt treatment and prevent advanced forms. In this context, we conducted an analytical study covering the period from 1 January to 31 December 2024, with the overall objective of evaluating the main follow-up markers in chronic HBV carriers seen at the bacteriology-virology laboratory of the Fann University Hospital. The results show that the 20–39 age group is the most affected by HBV carriage, with an average age of 37 ± 9.88 years. Males are slightly more represented (53%), which is consistent with several previous studies highlighting increased susceptibility in men. The prevalence of HBeAg was 3.09%, with a clear male predominance (75% compared to 25% in women). No patients expressed anti-HBc IgM, indicating the absence of acute reactivation or recent hepatitis, while anti-HCV antibodies were found in only 0.75% of individuals. Although the prevalence of HBeAg is low and anti-HBc IgM is absent, these results remain concerning. Chronic HBV carriage represents a significant risk of transmission in the general population, particularly among young adults, and is a determining factor in the development of serious complications such as cirrhosis or hepatocellular carcinoma.

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