International African Review of Multidisciplinary Sciences

Open Access

Epidemiology and impact of hepatitis B virus on haemato-biochemical parameters in patients in Conakry (Republic of Guinea)

Taliby Dos CAMARA[1,5],Abdoulaye MAKANERA[1], Ahmadou Sadio DIALLO[1], Cesar HAGASSOU[1], Ousmane SOW [2], Fassou René KOLIE[1,5] , Adama Oury BAH[3], Djouoiyra MOHAMED[4]

[1] Faculty of Science, Gamal Abdel Nasser University of Conakry, BP : 1147 Republic of Guinea
[2] Laboratory at the 'Roger Santoni' Medical Centre in Kobayah, Commune of Ratoma, Conakry, Republic og Guinea
[3] Biomedical analysis laboratory Alouse CO Guinea, Commune of Dixinn, Conakry-Republic of Guinea
[4] Biomedical analysis laboratory at the Ratoma Communal Medical Centre, Conakry-Republic of Guinea
[5] Medical Biology Laboratory, Mahatma Gandhi University, Guinea

Corresponding Author: *TD. Camara, Email: talibycamara@gmail.com*

Abstract:
Introduction: Infection with the hepatitis B virus is a major public health problem worldwide. There are an estimated 350 million chronic HBsAg carriers worldwide. **Objective**: To determine the prevalence of HBV and hepatic and blood disorders by testing for HBsAg and measuring transaminases in patients at health facilities in Conakry. **Method** : This is a prospective, descriptive, cross-sectional study covering a six-month period from 1 July to 1 December 2022. **Results** : Serodiagnosis of the hepatitis B virus in 746 patients in Conakry revealed 101 positive cases, i.e. a prevalence of 14%, compared with 645 negative cases, i.e. 86%. 78% of patients had haemoglobin levels <12 g/dl, with the following anaemic typology: 61% had a haemoglobin level between 10 and 11 g/dl (a sign of frustrated anaemia), 34% had a haemoglobin level between 8 and 9 g/dl (a sign of moderate anaemia) and 5% had a haemoglobin level $\leq$ 7 g/dl (a sign of severe anaemia); 42% of patients had low lymphocytes, 26% low monocytes, 19% low neutrophils and 14% low leukocytes. While 30% of patients had hyperleukocytosis and 31% hyperlymphocytosis. The transaminase assay showed that 75% of patients had increased ALT levels and 66% had increased AST levels. Married people were the most represented with a prevalence of 68% against 32% of single people. The female sex was the most affected with 80% against 20% for the male sex. Almost all socio-professional categories were affected by hepatitis B with a predominance of Housewives with 26/101, i.e. 26%, followed by Workers with 19/101, i.e. 19%, Commercial and Administrative workers with 18%, Pupils/Students with 17%. The age group between 31-40 years with 36% followed by 21-30 years with 35% were the most represented in this study. The commune of Ratoma is the most represented with 60%, followed by Dixinn with 17% and the commune of Matoto with 12%. **Conclusion**:Hepatitis B is a major public health problem and in order to improve the management of patients, the determination of haematological parameters is necessary.

Keywords: Hepatitis B, haematology, biochemistry, epidemiology, Conakry.

Introduction

Infection with the hepatitis B virus (HBV) is a major public health issue worldwide, with an estimated 350 million chronic HBsAg carriers [1, 2]. This condition is prevalent across all regions of the world, although its distribution varies. The highest levels of endemicity are observed in sub-Saharan Africa and Southeast Asia [1, 5, 3, 4, 6]. Regions with a medium prevalence of hepatitis B include Eastern Europe, North Africa, Greece, and Japan, while lower prevalence rates are found in Northern Europe and the United States [2].

HBV transmission occurs both vertically, from mother to newborn at birth, and horizontally, through close contact with infected individuals, particularly during the perinatal period [6]. Other transmission routes

include percutaneous or mucosal exposure to infected blood or biological fluids, as well as sexual transmission, which is facilitated by high-risk behaviors such as multiple sexual partners, polygamy, male homosexuality, and circumcision [6, 7].

HBV infection can lead to acute hepatitis, which progresses to chronic hepatitis in approximately 5% of adults and up to 90% of children [8]. Complications such as cirrhosis and hepatocellular carcinoma account for approximately 650,000 deaths globally each year [8, 9].

Regarding HIV, around 37 million individuals are infected worldwide, with approximately 2.6 million cases of HBV/HIV co-infection [8, 10, 11]. In 2019, Makanéra et al. reported an HBV seroprevalence of 17.9% in Guinea, an HIV prevalence of 10.5%, and an HBV/HIV co-infection rate of 2.3% [4].

The objective of this study is to determine the prevalence of HBV and assess its impact on liver and blood parameters by testing for HBsAg and measuring transaminase levels in patients attending healthcare facilities in Conakry.

Methods

Study Setting and Design

This prospective, descriptive, cross-sectional study was conducted over a six-month period, from July 1 to December 1, 2022, in Conakry, Guinea. Data collection took place in the microbiology laboratories of Gamal Abdel Nasser University, the 'Roger Santoni' Medical Centre in Kobayah, the Alouse CO Guin'ee biomedical analysis laboratory, the biomedical analysis laboratory of the Ratoma Communal Medical Centre, and the medical biology laboratory of Mahatma Gandhi University. The study targeted all patients, regardless of sex or age, who underwent serological testing for hepatitis B virus (HBV) during the study period. The sample size (N = 746) was determined using the Schwartz formula, based on the average hospital prevalence of HBV in Conakry.

Study Variables

The study analyzed both biological and epidemiological variables:

- **Biological Variables:** Hepatitis B surface antigen (HBsAg), total hemoglobin (THb), mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), transaminases (ALT and AST), and complete blood count (CBC).
- **Epidemiological Variables:** Age, sex, marital status, occupation, and place of residence.

The biological samples consisted of patient blood, used for HBV serology, detection of viral antigens and antibodies, and transaminase measurement.

Data Collection and Processing

Data were collected using a standardized survey form developed according to the study objectives. Patient information and blood samples were obtained and analyzed. The collected data were entered into Microsoft Word 2018, processed, and analyzed using SPSS version 2021.

Ethical Considerations

Prior to the study, informed consent was obtained from all participants. Confidentiality was ensured throughout the data collection process, and the results were used strictly for therapeutic and scientific purposes in compliance with ethical standards.

Statistical Analysis

Data were entered, processed, and analyzed using SPSS version 2021, Microsoft Word, and Excel 2016. Descriptive statistics, including frequency distributions and percentages, were used to summarize categorical variables. Continuous variables were presented as means and standard deviations. Comparative analyses were performed using appropriate statistical tests to identify significant associations.

Results

The research methodology applied in this study yielded results presented in tabular format, which were analyzed and interpreted in accordance with relevant literature.

Table 1: *Prevalence of HBV in patients seen in the laboratory*

HBsAg serology	**n**	**Percentage**
Positive	101	14
Negative	645	86
Total	746	100

The findings presented in Table 1 indicate that among the 746 patients tested in the laboratory, 101 were diagnosed as HBsAg-positive, representing a prevalence rate of 14%, while 645 tested negative, accounting for 86%.

Table 2: *Variation in haematological parameters in Hepatitis B patients*

Parameters	Values					
	Low		Normal		High	
	n	%	n	%	n	%
Haemoglobin	79	78	22	22	-	-
Leukocytes	14	14	57	56	30	30
Lymphocytes	42	42	28	28	31	31
Monocytes	26	26	74	73	1	1
Neutrophils	19	19	81	80	1	1
Basophils	-	-	99	98	2	2
Eosinophils	-	-	100	99	1	1

Table 2 illustrates the hematological variations observed among Hepatitis B patients. Of the 101 individuals diagnosed with Hepatitis B, 79 (78%) had hemoglobin levels 12 g/dL, indicating a notable prevalence of anemia. Additionally, 42% exhibited lymphopenia, 26% had reduced monocyte counts, 19% presented with neutropenia, and 14% experienced leukopenia. Conversely, 30% of patients had leukocytosis, and 31% exhibited lymphocytosis. These findings suggest a substantial hematological impact associated with Hepatitis B infection.

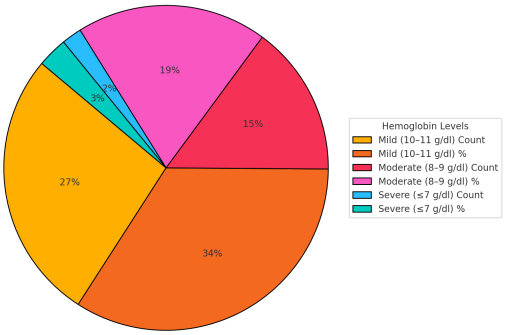

Figure 1: *Haemoglobin levels in Hepatitis B patients.*

In this figure 1 , we see that of the 79 hepatitis B patients with haemoglobin levels < 12 g/dl, the anaemia typology below shows that 48 patients have haemoglobin levels between 10-11 g/dl, i.e. 61% (sign of frustrated anaemia), 27 patients have haemoglobin levels between 8 and 9 g/dl, i.e. 34% (sign of moderate anaemia) and 4 patients have haemoglobin levels ≤ 7 g/dl, i.e. 5% (sign of severe anaemia). This shows that in patients with hepatitis B, haemoglobin levels need to be monitored. However, in the 61% of patients with frustrated anaemia and 34% with moderate anaemia, this situation could be corrected by a good, rich, balanced diet. In the 5% of patients with severe anaemia, however, a blood transfusion is essential prior to any treatment.

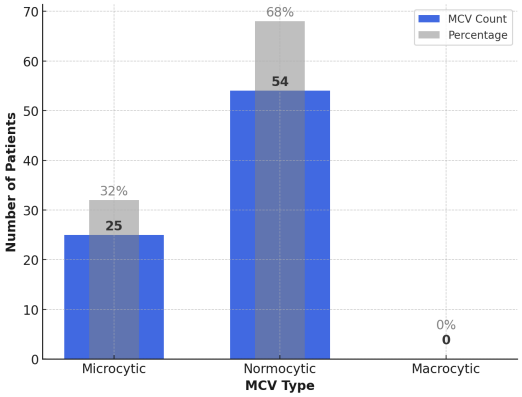

Figure 2: *VGM levels in Hepatitis B patients with anaemia.*

The analysis of Figure 2 reveals that among the 79 hepatitis B patients with anaemia, 25 (32%) had a VGM level below 80 femtolitres, indicative of microcytic anaemia. The remaining 54 patients (68%) had VGM levels between 80 and 100 femtolitres, characteristic of normocytic anaemia. Microcytic anaemia is defined by the presence of abnormally small red blood cells and is often associated with iron deficiency, leading to hypochromia due to impaired haemoglobin synthesis.

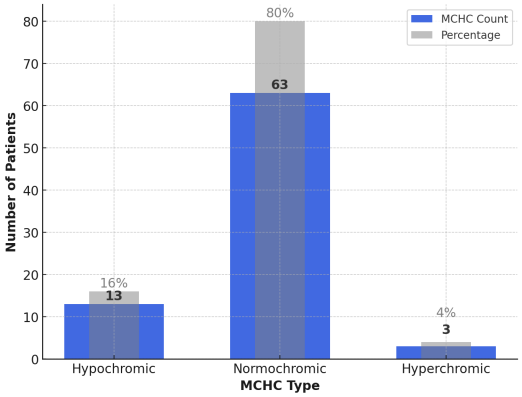

Figure 3: *MCHC levels in Hepatitis B patients with anaemia.*

The analysis of Figure 3 indicates that among the 79 patients with hepatitis B and anaemia, 13 (16%) had a MCHC level below 32, indicative of hypochromic anaemia. Additionally, 63 patients (80%) had a MCHC

level of 32, corresponding to normochromic anaemia, while 3 patients (4%) had MCHC levels between 32 and 36, suggestive of hyperchromic anaemia.

Table 3: *Pathophysiological variations in biochemical parameters in patients with HBV*

Biochemical parameters	**Low**		**Normal**		**High**	
	n	**%**	**n**	**%**	**n**	**%**
ALT	-	-	25	24.75	76	75.25
AST	-	-	34	33.66	67	66.34

The analysis of Table 3 reveals variations in transaminase levels among the 101 patients with HBV. Elevated ALT levels were observed in 76 patients (75%), while 25 patients (25%) had normal ALT levels. Similarly, increased AST levels were found in 67 patients (66%), whereas 34 patients (34%) had normal AST levels.

In patients with HBV, transaminase results clearly show that infection with the hepatitis B virus leads to significant liver damage, characterised by elevated levels of transaminase in the blood.

Table 4: *Distribution of hepatitis B patients according to variations in epidemiological parameters*

Epidemiological parameters	**n**	**Percentage**
Marital status		
Married	81	80
Single	20	20
Gender		
Female	70	69
Male	31	31
Socioprofessional categories		
Pupils/students	17	17
Administrative staff	18	18
Commercial staff	18	18
Workers	19	19
Housewives	26	26
Health workers	3	3
Age groups		
0 - 15 years	3	3
16 – 20 years	4	4
21 – 30 years	35	35
31 – 40 years	36	36
41 – 50 years	14	14
51 and over	9	9
Residence		
Ratoma	61	60
Kaloum	2	2
Matam	6	6
Dixinn	17	17
Matoto	12	12
Outside Conakry	3	3
Total	**101**	**100**

Outside Conakry: Patients from the prefectures of Coyah and Dubréka.

The analysis of Table 4 indicates that married individuals are the most represented group, with a prevalence of 68%, compared to 32% for single individuals. This trend could be attributed to polygamy and a lack of awareness about virus transmission. Women are the most affected, representing 80% of cases, compared to 20% for men. This predominance appears random and may be explained by insufficient knowledge about disease transmission, as the virus does not exhibit a sex-based preference. Hepatitis B affects nearly all socio-professional categories, with housewives being the most impacted (26/101, 26%), followed by manual workers (19/101, 19%), commercial and administrative workers (18/101, 18%), and students (17/101, 17%). Healthcare workers are the least affected, with only 3 cases (3%). The high prevalence among housewives and other groups could be linked to a lack of information on hepatitis B transmission. All age groups are impacted, with the highest prevalence in the 31-40 age group (36 cases, 36%), followed by the 21-30 age group (35 cases, 35%), likely due to active sexual behavior and limited awareness of virus transmission. Geographically, the commune of Ratoma is the most affected, with 61 cases (60%), followed by Dixinn (17 cases, 17%) and Matoto (12 cases, 12%). The communes of Kaloum and Matam report the lowest prevalence, with 2 cases (2%) and 6 cases (6%), respectively. The high prevalence in Ratoma may be attributed to its dense population and the higher number of patients from this area who participated in the survey.

Discussion

This study provides valuable insights into the prevalence and hematological impact of hepatitis B virus (HBV) infection in Conakry. Conducted between July 1st and December 1st, 2021, our prospective and descriptive study involved testing for HBsAg across multiple healthcare facilities, including the Biology Laboratories of UGANC, CMC of Ratoma, the "Roger Santoni" Medical Center in Kobayah,Alouse CO Guinea and the medical biology laboratory of Mahatma Gandhi University. Additionally, we assessed liver function by measuring transaminase levels. Our findings indicate an HBsAg prevalence of 14% among the 746 patients tested, aligning with previous reports of HBV endemicity in sub-Saharan Africa.

Hematological analysis revealed that 78% of patients had hemoglobin levels below 12 g/dL, with varying degrees of anemia: 61% exhibited mild anemia (hemoglobin levels between 10 and 11 g/dL), 34% had moderate anemia (8-9 g/dL), and 5% suffered from severe anemia ($\leq$ 7 g/dL). Additionally, 42% of patients presented with lymphopenia, 26% with monocytopenia, 19% with neutropenia, and 14% with leukopenia. Conversely, 30% of patients exhibited leukocytosis, and 31% had lymphocytosis, suggesting significant alterations in immune response due to HBV infection.

The gender distribution of HBsAg-positive patients showed a predominance of females (80%) over males (20%), yielding a sex ratio of 2.25 in favor of females. While HBV is generally considered to affect both sexes equally, this trend could be attributed to healthcare-seeking behavior, cultural factors, or biological susceptibility. Previous studies have reported contrasting trends; for instance, Makanera et al. (2023) documented a higher prevalence in males (71.3%) compared to females (28.7%), with a sex ratio of 2.4 [4]. Additionally, studies in Mali [14] and Côte d'Ivoire [15] have similarly found higher HBsAg carriage rates among men, possibly due to genetic predispositions that enhance viral persistence [7].

Age distribution analysis indicated that HBV predominantly affected individuals aged 30-39 years (28.7%), followed by those aged 21-30 years. The mean patient age was 39.45 years ($\pm$14.43 years), ranging from 10 to 97 years. This pattern suggests that the most affected individuals belong to an age group characterized by increased sexual activity and occupational exposure to infection risks. Similar findings were reported by Agbeno et al. in Togo, who found a mean age of 29 $\pm$13.5 years [16]. The relatively low prevalence of HBV among children in our study may be linked to a lack of pediatric patients in our sample population.

The distribution of HBsAg-positive cases across socio-professional categories showed that nearly all professional groups were affected. The highest prevalence was observed among housewives (26%), followed by workers (19%), commercial and administrative employees (18%), and students (17%). Our findings align with those reported by Makanera et al. (2019), who found the highest HBV prevalence among civil servants (25.5%) and traders (17.0%) [17]. These results highlight the necessity for targeted HBV awareness and screening campaigns among diverse occupational groups.

Liver function assessment indicated elevated transaminase levels in a significant proportion of patients, with 75% exhibiting increased ALT levels and 66% showing elevated AST levels. These findings are consistent with those of Makanera et al. (2022), who reported that 36.2% of HBsAg-positive patients had normal AST levels ($\leq$ 39 IU/L), while 11.7% had AST levels above 39 IU/L [4]. Elevated transaminase levels suggest ongoing hepatocellular injury, reinforcing the need for early HBV detection and management to prevent disease progression.

In summary, our study highlights a substantial burden of HBV infection in Conakry, with significant hematological and hepatic alterations among affected individuals. These findings underscore the necessity of enhanced public health interventions, including expanded HBV screening, vaccination campaigns, and improved access to antiviral treatment, particularly among high-risk demographic groups.

Conclusion

At the end of our study of the haemato-biochemical and epidemiological profile of hepatitis B patients in the city of Conakry, it emerged that infection with the hepatitis B virus is a major public health problem in the Republic, due to its prevalence and severity.

Indeed, the seroprevalence obtained (14%) confirms the high endemicity of HBV infection in our country, although the results obtained from 746 people remain minimal compared with the general population.

The transaminase assay showed that 76 patients had increased ALT levels, i.e. 75%, and 67 patients had increased AST levels, i.e. 66%.

However, these results need to be confirmed by a national study with more random recruitment, in order to better understand the current extent of hepatitis B in Guinea, since, according to studies, HBV is 50 to 100 times more contaminating than HIV.

The lack of information, awareness and knowledge of the modes of contamination among the general public are thought to be at the root of this situation. However, improving the health care of hepatitis B patients requires monitoring of hematobiochemical parameters.

Acknowledgements

This work was financed by grants from the Department of Health of the Republic of Guinea (Cod 18/Subvention/2022) in relation to the CMC of Ratoma and the Centre Médical "Roger Santoni" of Kobayah, the Laboratoire d'analyses biomédicales Alouse CO Guinée and of the Université Gamal Abdel Nasser of Conakry and that of the Université Mahatma Gandhi. The authors would like to thank the managers and technicians for their support in carrying out this study.

To Cite this Article

Camara TD, Diallo AS, Hagassou C, Sow O, Bah AO, Mohamed D. Epidemiology and impact of hepatitis B virus on haemato-biochemical parameters in patients in Conakry (Republic of Guinea). Int Afr Rev Multidiscip Sci. 2025;1(1):1-7.

Author Contributions

All authors contributed to the realization of this study. They have read and approved the final version of the manuscript.

Funding

This study did not receive any external funding. All costs were covered by the research team and participating institutions.

Conflict of Interest

The authors declare that there are no conflicts of interest associated with this study.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Dates

Received: 08/09/2024, Revised: 05/10/2024, Accepted: 12/01/2025 and Published Online: 05/05/2025

References

[1] WHO E. Management of hepatitis B and HIV co-infection. Copenhagen: WHO Regional Office for Europe. 2011.

[2] Aurpibul L, Lumbiganon P, Kolasaraksa P, et al. HIV and Hepatitis B Co-infection Among Perinatally HIV-infected Thai Adolescents. Pediatr Infect Dis J. 2012;31(9):943-947.

[3] Kye Duodu G, Nortey P, Malm K, et al. Prevalence of Hepatitis B virus co-infection among HIV-seropositive persons attending antiretroviral clinics in the Eastern Region of Ghana. Pan Afr Med J. 2016;25(Supp1):7.

[4] Makanéra A, Dos Camara T, Condé M, Bah FD, Diallo MA, Barry AO, Camara D, Diakité T. Hepatitis B virus infection and risk factors for hepatocarcinoma at the Kipé China-Guinea Friendship Hospital in Conakry. Int Clin Pathol J. 2022;9(1):30-33.

[5] André F. Epidemiology of hepatitis B in Asia, the Middle East, and Africa. Vaccine. 2000;18(Suppl. 1):S20-22.

[6] Lejeune O. La maladie. In: Trépo C, Merle P, Zoulim F, editors. Hépatites virales B et C. Paris: John Libbey Eurotext. 2006;149-161.

[7] Fattovich G. Natural history and prognosis of hepatitis B. Semin Liver Dis. 2003;23(1):47-58.

[8] Barth RE. Hepatitis B/C and HIV in sub-Saharan Africa: an association between highly prevalent infectious diseases. A systematic review and meta-analysis. Int J Infect Dis. 2010;14(12):1024-1031.

[9] Mandiwana A, Tshitenge S. Prevalence of HIV-hepatitis B virus co-infection among adult patients in Mahalapye, Ngami, Serowe, Botswana: a descriptive cross-sectional study. S Afr Fam Pract. 2017;59(3):94-97.

[10] WHO. Prevalence of hepatitis B virus infection worldwide by country. 2016.

[11] Diop M, Diouf A, Malaobé S, Lo G, Ka D, Massaly A, et al. Prevalence of hepatitis B virus surface antigen and associated factors in Senegalese soldiers sent on mission to Darfur. Pan Afr Med J. 2017;26:154.

[12] Eloumou SAFB, Luma HN, Noah DN, et al. Clinicopathological characteristics of a group of sub-Saharan African patients with chronic hepatitis B virus infection: A Gender Analysis. Gastroenterol Hepatol Open Access. 2016;5(8):00174.

[13] Montella M, D'Arena G, Crispo A, et al. Role of sex hormones in the development and progression of hepatitis B virus-associated hepatocellular carcinoma. Int J Endocrinol. 2015;2015:854530.

[14] Dao S, Bougoudogo F, Traoré S, et al. Hepatitis B surface antigen carriage in Mali: Ten-year screening assessment at the National Institute of Public Health Research (INRSP). J Afr Cancer. 2009;1(2):68-71.

[15] Kra O, N'Diri N, Ouattara B, et al. Prevalence of hepatitis B surface antigen carriage in a population of Ivorian gendarmerie recruits in 2008. Med Santé Trop. 2012;22(2):219-220.

[16] Agbenu E, Banla A, Kolou M, et al. Serological markers used for hepatitis B surveillance in Togo: Current status and proposed actions. Med Trop. 2008;68(6):621-624.

[17] Makanera et al., J.2019 Séroprévalence de la co-infection VIH /virus de l'hépatite B à l'Hôpital de l'Amitié sino-guinéenne (HASIGUI) Kipé/Conakry (Guinée). Journal of Applied Biosciences 135: 13789 - 13807

License