Epidemiology and prevalence of HBsAg in the student population of the Higher Institute of Technology of Mamou (Republic of Guinea).

Abstract

Introduction: Due to its frequency, complications and socio-economic consequences, hepatitis B constitutes an international public health problem comparable to that posed by other communicable diseases such as HIV, tuberculosis and malaria. Sub-Saharan Africa, with a prevalence rate between 8 and 18%, is a highly endemic region. **Objective:** to help protect the health of students through awareness and screening for the hepatitis B virus. **Method:** this is a prospective and descriptive longitudinal study which lasted one month, from February 15 to March 15, 2023 **Results:** among the 200 students screened for the hepatitis B virus, men were more represented (80.50%) than women (19.50%), with a m/f sex ratio of 4.12 in favor of men. The 17-25 age group was the largest (77%), followed by the 26-33 age group (19.5%), the 34-41 age group (3%) and the 42+ age group (0.5%). 32% of students say they have good knowledge of the hepatitis B virus, compared to 68% who say they have little knowledge. The majority reported television as a source (75.5%), followed by radio (16%), school (4%), newspapers (2.5%) and social media (2%). The vast majority identified sexual transmission (89%), followed by blood (9.5%) and saliva (1.5%). In terms of risky practices, the majority of students identify prostitution (82.5%), followed by tattooing (9%), piercing (5%) and acupuncture (3.5%). Concerning knowledge of the hepatitis B vaccine, the majority of students (67.5%) say they do not know the vaccine against the hepatitis B virus, compared to 32.5% who say they know the vaccine. The HBV prevalence test showed 11% carriage compared to 89% negative tests. Transaminase tests on positive cases gave 63.63% normal ALT versus 36.36% elevated ALT; 72.72% normal AST versus 27.27% high AST. Carriage was higher in men (86.36%) than in women (13.63%). Single students were the most represented with 95.45%, compared to 4.55% for married students. Students from the Technical Laboratory and Mechanical Design and Manufacturing Departments were the most represented with 27.27% each. They were followed by those of the Biomedical Equipment Technology and Computer Engineering Departments with 18.18% each. Finally, the Energy Department was the least represented in this series with 9.09%. **Conclusion:** This study showed that the hepatitis B virus is present at the Mamou Higher Institute of Technology. It is therefore important to introduce it into secondary school programs to improve knowledge of the hepatitis B virus in Guinea.

Key words: hepatitis B virus, knowledge, epidemiology, students and Department.

I. Introduction

Hepatitis B is a viral infection that attacks the liver. It can cause acute or chronic illnesses. Viral hepatitis is an international public health problem because of its frequency, complications and socio-economic consequences, comparable to that posed by other major communicable diseases such as HIV, Tuberculosis or Malaria. Sub-Saharan Africa, with a prevalence rate of between 8% and 18%, is an area of high endemicity [1]. Worldwide, some 240 million people suffer from chronic hepatitis B. Unless the response is scaled up and accelerated, projections show that the number of people with hepatitis B will remain at current high levels over the next 40 to 50 years, and the total number of deaths between 2015 and 2030 will reach 20 million, despite the existence

of an effective cure. It is no longer possible to wait to intensify the global response [2]. The majority of chronic hepatitis B virus infections are acquired at birth through so-called "vertical" transmission. This is the transmission of the hepatitis B virus from mother to child at the time of delivery, secondary to mother-child micro-transfusions during contractions and contact with infected vaginal secretions. The World Health Organization (WHO) estimates that more than 2 billion people have been infected with hepatitis B in their lifetime, or about 30% of the world's population [4]. According to the WHO, the hepatitis B virus (HBV) is 50 to 100 times more contaminating than HIV. Among this patient population worldwide, 360 million (or 5%) suffer from chronic infections, mainly on the Asian and African continents. More than one million of them die each year from complications related to this infection, especially liver cirrhosis and hepatocellular carcinoma. HBV is the second most common known human carcinogen after tobacco [4]. Also, it has been found that only 45% of HBsAg carriers know their HIV status, which leads to a delay in management and increases the risk of transmission of the disease [5]. In Madagascar, the country has a rate of 23% of people with hepatitis B, one of the highest in Africa [6]. This prevalence is 8.06% in Niger [7]. In Tunisia, 4 and 6% [8], Mali, 14.7% [9], Côte d'Ivoire, 9% [10] and Mauritania, the prevalence varies between 16 and 25% [11]. In the Republic of Guinea, as in other countries, this infection is very poorly known by the population, and yet it constitutes a real public health problem that affects all age groups, sex and all socio-professional strata.

II. Equipment and working methods

II.1 Study environment and framework: This study was carried out in the urban commune of Mamou. The biology laboratory of the Higher Institute of Technology of Mamou served as a framework for the realization of this work. The Higher Institute of Technology of Mamou is a public institution of a professional nature, under the Ministry of Higher Education, Scientific Research and Innovation. It was created by Order No. 2004/9245/MESRS/CAB of 25 August 2004 as part of the decentralization of Higher Education Institutions (HEIs) of the Republic of Guinea. Since its creation, it has six (6) departments, including Laboratory Techniques.

II.2 Working Materials: For the realization of this work, we used the following equipment: electric centrifuge, Aichek chromatographic immune test strip, stopwatch, pasteur pipettes, hydrophilic cottons, latex gloves, 5cc syringes, hemolysis tubes, safety boxes, garbage cans.

II.3 Method of work: This is a prospective and descriptive longitudinal study that took place from February 15 to March 15, 2023. The students of the Higher Institute of Technology of Mamou constituted our target population. All students who were regularly enrolled and who agreed to submit to our survey were included in this study. The sample was simple random and the sample size was n=200 students.

II.4 Biomaterial: Consists of students' blood

II.5 Parameters studied

A panel of biologists (microbiologists, epidemiologists and public health specialists) developed a set of items related to viral hepatitis B in the form of a validated questionnaire with a sample of 20 students regarding their understanding. This self-administered questionnaire by students focused on socio-demographic data and knowledge of viral hepatitis B.

The socio-demographic data were: age, gender, Department of belonging, sources of information (radio, television, social networks, newspapers). Knowledge focused on the existence of viral hepatitis B, sources of information, causative agent, routes of contamination, risk factors for infection and means of prevention.

II.6 Variables under study:

- Socio-demographic variables: age, sex, department of belonging, sources of information, routes of contamination, risky practices and marital status.

- Biological variable: HBsAg

II.7 Data collection methods and computer analysis

For data collection, we used pre-established survey sheets and the laboratory log. The information collected was manually processed, entered using Microsoft Word and Excel software on Windows 2016 and the analyses were done using the Epi Data software. For the analysis, we used SPSS® version 21 software. This analysis initially consisted of a descriptive analysis (means and frequencies) of sociodemographic parameters and knowledge of viral hepatitis B. In a second step, we studied the relationship between knowledge of the existence of viral hepatitis B and sociodemographic and academic factors in multivariate analysis by logistic regression. This relationship was expressed as odds ratio with its 95% confidence interval and as significance p (5% significance level).

II.8 Biological diagnostic methods for hepatitis B

For this work, we used the Aichek immunochromatographic assay technique for the detection of HBV surface antigen in serum. When the 1st tests positive, the students concerned were called back to the test twice within a week interval and always giving the same (positive) result. Principle of operation of the HBsAg test: The HBsAg (whole blood/serum/plasma) rapid test strip was designed to detect HBsAg by visual interpretation of the color development of the strip. The membrane was immobilized with anti-HBsAg antibodies on the test region. During the test, the sample reacts with the colloidal gold conjugates of stained anti-HBsAg antibodies, which have been pre-coated on the test sample buffer. The mixture then moves on the membrane by capillary action and interacts with the reagents present on the membrane. If there is enough HBsAg in the samples, a colored band appears at the level of the region - membrane test. The presence of this colored band indicates a positive result, while its absence indicates a negative result. The appearance of a coloured band in the control area serves as a procedural control. This indicates that an appropriate volume of sample has been added and a wicking effect on the membrane has occurred.

II.9 Ethical considerations

Before the study was conducted, we obtained the agreement and consent of each student, confidentiality was respected throughout the data collection procedure and the results were used for strictly therapeutic and scientific purposes. Our study was in line with the 1975 Declaration of

Helsinki on Ethical Principles for Medical Research Involving Human Subjects, as amended in 2008.

III. Results and discussion

The application of the research methodology led to the following results in the form of tables interpreted, commented and discussed according to the available literature data.

parameters Effective Percentage

Table I: Socio-demographic characteristics of the 200 students studied

parameters	Effective	Percentage
Sex		
Male	161	80.50
Feminine	39	19.50
Age groups		
17 – 25 years old	154	77
26 – 33 years old	39	19.5
34 – 41 years old	6	3
42 years and over	1	0.5
Knowledge of the hepatitis B virus		
Good knowledge	64	32
Little knowledge	136	68
Source of information		
Radio	32	16
Television	151	75.5
Newspapers	5	2.5
Social networks	4	2
Schools	8	4
Transmission routes		
Sanguine	19	9.5
Sexual	178	89
Salivary	3	1.5
Risky practices		
Prostitution	165	82.5
Acupuncture	7	3.5
Piercing	10	5
Tattoo	18	9
Knowledge of the existence of a vaccine		
Yes	65	32.5
No	135	67.5
Total	**200**	**100**

In this table, we find that male students are the most represented in this study with 161 students (80.50%) against 39 students (19.50%) for the female sex for a sex ratio M/F of 4.12 in favor of

the male sex. This very high number of males compared to females reflects the representation of women in technical training institutions in the Republic of Guinea.

Compared to the age groups of students, the 17-25 age group is the largest with 154 students (77%) followed by 26-33 with 39 students (19.5%), 34-41 years with 6 students (3%) and students aged 42 and over accounted for 0.5%.

Compared to knowledge of the hepatitis B virus, 64 students reported having a good knowledge of the hepatitis B virus with 32% compared to 136 students who claimed to have little knowledge about the virus (68%).

Compared to news sources, the majority of students surveyed claimed television as a source with 151 students (75.5%), followed by radio with 32 students (16%), at school with 8 students (4%), in newspapers with 5 students (2.5%) and social networks accounted for only 2% in this series.

Compared to routes of transmission, the vast majority of students reported sexual route with 178 students, or 89%, through blood with 19 students (9.5%) and through saliva with 3 students (1.5%).

In relation to risky practices, the majority of students pointed the finger at Prostitution with 165 students, or 82.5%, followed by Tattooing with 18 students (9%), Piercing with 10 students (5%) and Acupuncture with 7 students (3.5%).

Compared to knowledge of the hepatitis B vaccine, the majority of students reported having no knowledge of the hepatitis B virus vaccine with 135 students (67.5%) versus 65 students who said they were aware of the vaccine (32.5%)

Table II: HBsAg research results among students

Review	Results	Number	Percentage
AgHBs	Positives	22	11
	Negatives	178	89
Total		**200**	**100**

In this table, we note that out of 200 students voluntarily tested for hepatitis B virus, 22 students were positive, a prevalence of 11% compared to 178 students who tested negative, or 89%. No cases of disability were observed among students. This denotes the healthy carrier character of positive students.

The high prevalence of hepatitis B virus infection among students may be due to lack of awareness of the virus and its modes of transmission. The hepatitis B virus is 50 to 100 times more contaminating than the VHI due to the contamination of all body fluids in HBV-infected individuals.

Table III: Pathophysiological variation of transaminase in students with hepatitis B virus

Transaminase	Values					
	Basses		Normal		High	
	Effective	%	Effective	%	Effective	%
ALAT	-	-	14	63.63	8	36.36
ASAT	-	-	16	72.72	6	27.27

This table shows that of the 22 students with hepatitis B virus, there is a variation in transaminase levels:

- 14 patients had a normal ALT level, or 63.63% compared to 8 students who had a high ALT level, or 36.36%.

- 16 students had a normal AST rate, or 72.72% compared to 6 students who had a high ASAT rate, or 27.27%. These results clearly show that in patients with hepatitis B, there are variations in transaminase. This explains why hepatitis B virus infections lead to significant liver damage characterized by elevated levels of ALT and AST in the blood of students.

Table IV: Distribution of students with hepatitis B virus by socio-demographic parameters

Parameters	Effective	Percentage
Sex		
Male	19	86,36
Feminine	3	13,63
Age groups		
17 – 25 years old	20	90.91
26 – 33 years old	1	4.55
34 – 41 years old	-	-
42 years and over	1	4.55
Situation matrimoniale		
Married	1	4.55
Singles	21	95.45
Departments of belonging		
Laboratory Techniques	6	27.27
Energy	2	9.09
Biomedical Equipment Technology	4	18.18
Computer Engineering	4	18.18
Mechanical Design and Manufacturing	6	27.27
Total	**22**	**100**

It emerges from this table that of the 22 students with the hepatitis B virus, the male sex was the most represented with a prevalence of 86.36% against 13.63% for the female sex in this study. It is important to emphasize that the students enrolled in the training programs are mostly male with about 80% representativeness. In general, female students do not opt for technical sciences. The

high prevalence of the male sex is random because both sexes have the same risk of contamination of the hepatitis B virus.

The 17-25 age group is the most represented with 20 cases, or 90.91% followed by that of 26-33 and 42 years and over with 4.54 each. No cases were recorded in the 34-41 age group. The high prevalence in the 17 – 25 age group could be due to their representativeness in the student population. It is the normal age of formation. Recycled students are the least numerous at the Higher Institute of Technology of Mamou.

Singles are the most represented in this study with 21 cases, or 95.45% against married with 4.55%. The high prevalence of hepatitis B virus among single people could be explained not only by their greater representativeness in the student population but also by their large number among volunteers in surveys.

Students from the Technical Laboratory and Mechanical Design and Manufacturing Departments were the most represented with 27.27% each. They are followed by the Departments of Biomedical Equipment Technology and Computer Engineering with 18.18% each. Finally, the Energy Department was the least represented in this series with 9.09%. The high prevalence in the Laboratory Technical Departments and Mechanical Design and Manufacturing could be due to their high representativeness in the sample during our surveys.

IV. Discussion

Our survey focused on 200 students from all the Departments of the Higher Institute of Technology of Mamou. Male students are the most represented in this study with 161 students (80.50%) against 39 students (19.50%) for the female sex for a sex ratio M/F of 4.12 in favor of the male sex. The majority of the students surveyed cited television as a source with 151 students (75.5%), followed by radio with 32 students (16%), at school with 8 students (4%), in newspapers with 5 students (2.5%) and social networks accounted for only 2% in this series (Table I).

Our results are comparable to those reported by Lohouès-Kouacou and Col, in 2013, in Côte d'Ivoire, found that the sex ratio M/F was 1.68 or 76.6% claimed to have heard of viral hepatitis B [12].

Compared to the age groups of students, the one between 17-25 years is the most represented with 154 students (77%) followed by 26 – 33 years with 39 students (19.5%), 34-41 years with 6 students (3%) and students aged 42 and over accounted for 0.5%.

Compared to knowledge of the hepatitis B virus, 64 students reported having a good knowledge of the hepatitis B virus with 32% compared to 136 students who reported having little knowledge about the virus (68%) (Table I).

Compared to news sources, the majority of students surveyed cited television as a source with 75.5%, followed by radio with 16%, at school with 4%, in newspapers with 2.5% students and social networks accounted for only 2% in our study (Table I).

Compared to routes of transmission, the vast majority of students reported sexual route with 89%, blood with 9.5% and saliva with 1.5% (Table I).

Lohouès-Kouacou and Col in 2013 reported that the contagiousness of the disease and the route of sexual transmission of viral hepatitis B were known to 49.1% and 39.3% of students, respectively. The availability of an HBV vaccine was known by 48.9% of students. The main known risk behaviour was tattooing (40.8%) [12].

The proportion of knowledge of the hepatitis B vaccine, the majority of students reported having no knowledge of the hepatitis B virus vaccine with 135 students (67.5%) compared to 65 students who reported knowledge of the vaccine (32.5%) (Table I).

Compared to risky practices, the majority of students in our study pointed to Prostitution as the high-risk practice 82.5%, followed by Tattooing with 9%, Piercing with 5% and Acupuncture with 3 Risk practices were known by less than 40% of students who had heard of viral hepatitis. Fewer than one in five of these students knew the clinical signs suggestive of the disease. The vast majority (67.4%) of students were unaware that there was an effective HBV vaccine, Lohouès-Kouacou and Col reported in 2013 [12]. This lack of awareness of HBV vaccine was also reported in the study by Slonim et al. [15]. In Côte d'Ivoire, HBV vaccine is not universally applied in adolescents; Therefore, their vaccination depends on an individual initiative. However, according to Hwang et al., individual adherence to this vaccination would be favored by a good knowledge of HBV [16]. In general, insufficient knowledge of viral hepatitis by the students interviewed was observed in several studies in Australia [17] as well as in the United States [14], Egypt [18] or China [19; 20].

In our study of 200 students tested for hepatitis B virus at the Higher Institute of Technology in Mamou, 22 students were positive, a prevalence of 11% compared to 178 students who tested negative, or 89%. No cases of disability have been observed in students with HBsAg (Table II).

Our results are comparable to those of some authors. Indeed, a study carried out between May 2009 and November 2010 in the District of Bamako (the CHU Gabriel Touré, the CHU du Point G, the National Police School, the mobile security group FMPOS) and Kati by DEMBELE R., in 2011, reported a prevalence of HBs antigen of 13.97% on all samples [22]; In Tunisia, Jemni L and Chatti N, in 1994, reported 4 and 6% [22], in Mali, Bougoudogo et al., found 14.7% [23], in Côte d'Ivoire, Sombo et al., in 1987, found 9% [24] and in Mauritania Lô BB, in 1994, found a prevalence that varies between 16 and 25% [25].

The particularity of this infection in our study lies in its high frequency in men (86%) and females (14%). This result is higher than that of DEMBELE N., with 57.05% in 2006 [26].

V. Conclusion

Our study shows that out of a total of 200 students sampled, 22 were positive for HBV or 11% against 178 negative for HBV or 89%. Males were the most infected with a prevalence of 86.36% compared to 13.63% of females. The 17-25 age group presented 20 positive HBV cases or 90.91%. Single people who were not only the most represented in the samples, were also the

most affected by HBV with 95.45%. The Laboratory Technical and Mechanical Design and Manufacturing departments were the most affected (infected) with an equal rate of 27.27.

The results of transaminase were significant: 63.63% of patients with hepatitis B virus had a normal ALT level of ALT compared to 36.36% of patients had a high ALT level. 72.72% of patients had a normal AST level compared to 27.27% of patients had a high AST level.

The low level of knowledge of the students of the Higher Institute of Technology of Mamou on HBV, particularly on prevention (routes of contamination, risky practices and vaccine) is a reflection of the situation of knowledge of the virus in all Higher Education Institutions in Guinea.

Vaccination is the most effective means of prevention against this disease, which is the second leading cause of liver cancer in the world after tobacco.

The early introduction of viral hepatitis B into school curricula and the improvement of their social living conditions could promote a better level of knowledge about the disease through access to information to the greatest number of learners.

In short, this study on the epidemiology and prevalence of hepatitis B among the student population of the Higher Institute of Technology of Mamou is part of the awareness campaign and voluntary screening of hepatitis B in training structures in Guinea.

VI. Conflicts of interest: None

VII. Authors' contributions

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

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