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Epidemiological Profile of Hiv/Hbv Co-Infection among Patients Attending Hospital Consultations in Brazzaville

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ABSTRACT

HIV and HBV infections remain a serious public health problem in sub-Saharan countries. From time to time, we see rapidly increasing prevalence rates, and co-infection remains a major issue that public authorities around the world, and in Africa in particular, are working to resolve. Our cross-sectional, descriptive study was conducted among 130 patients who came for consultation and attended the laboratory department of the Djiri General Hospital in Brazzaville. After collecting plasma samples, rapid screening tests were used. Positive cases were confirmed using the ELISA technique. Of the 130 participants, 8.46% and 4.62% were diagnosed as HIV-positive and HBV-positive, respectively, with an HIV/HBV co-infection prevalence of 9.09%. We found no significant association between the two infections and socio-demographic characteristics. Our results showed low prevalence of both infections, with a predominance in the 12-35 age group, i.e., young people. In view of the results, it would be important to intensify actions targeting young girls, as women remain the most vulnerable sex likely to contract either HIV or HBV in the present study.

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Introduction

Human immunodeficiency virus (HIV) infection remains a major global public health problem, particularly in sub-Saharan Africa, where prevalence rates are highest. At the same time, hepatitis B virus (HBV), which causes chronic liver diseases such as cirrhosis and hepatocellular carcinoma, also poses a considerable health burden in this region of the world [1]. The modes of transmission of HIV and hepatitis B (HBV) are similar, as both can be transmitted through sexual contact, making hepatitis B a sexually transmitted infection (STI). In addition, HIV-hepatitis B co-infections are common, particularly in vulnerable communities. These co-infections often lead to complications such as cirrhosis, and liver disease has become one of the leading causes of death among PLHIV [2]. This virological association worsens patient prognosis, accelerates the progression of liver disease, and complicates therapeutic management, particularly due to drug interactions and increased risks of hepatotoxicity [3].

According to the World Health Organization, 2 to 4 million people worldwide are co-infected with HIV and HBV, with a prevalence of 5 to 10% in Western Europe and 20 to 30% in Africa [1,4]. In sub-Saharan Africa, the prevalence of HIV-HBV co-infection varies between 10-20% in West and Central Africa. In these areas, the prevalence of HIV varies between 6-10%. In Cameroon, it is 2.1%, with chronic active carriage of viral hepatitis B and C two to three times higher in the population [5-7].

In the Republic of Congo, although efforts have been made to strengthen HIV testing and care, data on HBV co-infection remain limited [8]. However, knowledge of the prevalence of this co-infection and its sociodemographic characteristics is essential for adapting prevention, early detection, and integrated treatment strategies. The separate prevalences of HIV and hepatitis B range from 1.2% to 7% and from 5% to 15% [9-11].

The present study aims to determine the prevalence of HIV/HBV co-infection in a population attending an urban hospital in Brazzaville and to describe its epidemiological characteristics with a view to improving patient care.

Materials and Methods

Type and Period of Study

This was a cross-sectional, descriptive study conducted from June 15 to July 27, lasting one month and 12 days.

Study Population

The study population consisted of patients attending the laboratory department of Djiri General Hospital.

Inclusion Criteria

Our study included inpatients and outpatients attending the laboratory department of Djiri General Hospital who had come for a medical consultation and agreed to participate in the study.

Study Sample

This was a random probability sample, as these patients were eligible on an ongoing basis without randomization after obtaining their informed consent. We worked on a total of 130 samples collected in EDTA tubes.

Methodology

After obtaining administrative approval for the research project, we informed patients who came to the department about the merits of this study. Once their consent was obtained, we proceeded with blood sampling in accordance with the art of healthcare professionals dedicated to this task. Consent was signed by each participant in this study.

Data Collection

Data was collected using a survey form designed for this purpose. Information on age, gender, occupation, marital status, and reason for consultation was gathered. Some participants who wanted to know more were informed by the team on duty, consisting of biologists, qualified technicians, and laboratory assistants. The objectives were discussed with the study participants.

Biological Samples

We took blood samples from the participants in this study. Blood samples were taken from participants from the elbow crease and collected in EDTA tubes to obtain plasma. Once collected, the plasma was decanted, poured into Eppendorf tubes, and stored in the hospital laboratory refrigerator at -20°C.

Biological Analysis

The biological results were obtained using rapid screening tests (TODR, HIV referenced under number VIH-402 in batch no. E2411021 stored between 2 and 30°C and AgHBs referenced under number 142-050/S in batch B201912046, stored between 4 and 30°C) and by the ELISA chain technique, both for the detection of anti-HIV antibodies (referenced under number PT-HIV1,2-95 in batch 96001) and HBS antigen of the hepatitis B virus (batch 131108) for TODR-positive cases. With regard to the ELISA technique, we first calibrated the reagents through a series of washes and dilutions in accordance with the manufacturer's recommendations in order to obtain the standard density curve before analyzing the sample itself.

Statistical Analysis

Statistical analysis was performed using Excel spreadsheets and Stata 13 softwares. For the analysis of data according to age, the population in our study was subdivided into two age groups: young people (12 to 35 years old) and adults (36 to 87 years old). 95% confidence intervals (CI) were used to identify the strength of the association. We assessed the risk (odds ratio: OR) with the association of each explanatory variable together with the carriage of each virus using a logistic regression model to take risk factors into account. Associations were considered statistically significant for $p < 0.05$.

Results

Socio-Demographic Characteristics of Participants

Table I shows that the average age of our study was 32 years (+/- 13.9). The majority of our study population was male (64.62%). Those with the marital status of workers (civil servants) accounted for 40.77%, with a predominance of single people (73.08%).

Table 1: Socio-Demographic Characteristics of Participants

Caractéristic	Population (N=130)	Proportion en %
Age, extreme (min, max)	(12 ; 87)	
Age, mean (standard deviation)	32 (+/- 13,9)	
Median age (q1 ; q3)	30 (22 ; 37)	
Gender		
Male	46	35.38
Féminin	84	64.62
Occupation		
Unemployed	27	20.77
Student	43	33.08
Retired	7	5.38
Worker	53	40.77
Marital Status		
Single	95	73.08

Divorced	1	0.77
Married	32	24.62
Widowed	2	1.54

HIV Prevalence in the Study Population

HIV prevalence in the study population was reported at 8.46% (Table 2).

Table 2: HIV Prevalence

Effectif des personnes enquêtées	Nombre de cas positif au HIV	Prévalence du HIV en %	Intervalle de confiance à 95%
130	11	8.46	4.30 – 14.64

HBV Prevalence in the Study Population

Table 3 shows an HBs antigen prevalence of 4.62% in the overall study population.

Table 3: HBV Prevalence

Number of people surveyed	Number of HBV-positive cases HBV	prevalence in %	95% confidence interval
130	6	4.62	1.71 – 9.78

Correlation between HIV and HBV in the Population

We note (Table IV) that HBV infection is distributed evenly across both modalities (positive and negative). There was no significant association between HIV infection and HBV infection in our study population (p=0.42).

Table 4: Correlation between HIV and HBV

HBV	VIH						
			Negative		Positive		
	N=130	%	N=119	%	N=11	%	P
Negative	124	95.38	114	95.80	10	90.91	0,42
Positive	6	4.62	5	4.20	1	9.09	

Correlation between HBV and Socio-Demographic Characteristics

By correlating sociodemographic characteristics with HBV infection in Table V, we found that there was no significant association in our study population.

Table 5: Correlation between HBV and Socio-Demographic Characteristics

Socio-demographic characteristics	HBV results						
	Negative		Positive				
	N=124		N=6		N=130		P
	n	%	n	%	n	%	
Age groups							**0.43**
[12 to 35 years old]]	91	73.39	3	50.00	94	72.31	
[36 to 87 years old]]	33	26.61	3	50.00	36	27.69	
Gender							**1.00**
Male	44	35.48	4	33.33	46	35.38	
Female	80	64.52	2	66.67	84	64.62	
Occupation							**0.40**
Unemployed	27	21.77	0	0.00	27	20,77	
Student	41	33.06	2	33.33	43	33.08	
Retired	6	4.84	1	16.67	7	5.38	
Worker	50	40.33	3	50.00	53	40.77	
Marital status							**0.11**
Single	93	75.00	2	33.33	95	73.08	
Divorced	1	28	0.81	0	0.00	1	0.77
Married	28	22.58	4	66.67	32	24.62	
Widowed	2	1.61	0	0.00	2	1.53	

Correlation between HIV and Socio-Demographic Characteristics

Statistically, we did not find a significant association between HIV infection and socio-demographic characteristics when comparing the results of our study population, as shown in Table 6.

Table 6: Association between HIV and Socio-Demographic Characteristics

Socio-demographic characteristics	VIH Results						
	Negative		Positive				
	N=119		N=11		N=130		P
	n	%	n	%	n	%	
Age groups							**0.29**
[12 to 35 years old]]	84	70.59	10	90.91	94	72.31	
[36 to 87 years old]]	35	29.41	1	9.09	35	27.69	
Gender							**1.00**
Male	42	33.29	4	36.36	46	35.38	
Female	77	64.71	7	63.64	84	64.62	
Occupation							**0.25**
Unemployed	24	20.17	3	27.27	27	20.77	
Student	37	31.09	6	54.55	43	33.08	
Retired	7	5.88	0	0	7	5.38	
Worker	51	42.86	2	18.18	53	40.77	
Marital status							**0.89**
Single	86	72.27	9	81.82	95	73.08	
Divorced	1	0.84	0	0.00	1	0.77	
Married	30	25.21	2	18.18	32	24.62	
Widowed	2	1.68	0	0.00	2	1.54	

Discussion

Co-infection with hepatitis B virus (HBV) and human immunodeficiency virus (HIV) is becoming increasingly common worldwide, characterized by a lack of effective vaccines, the need for costly treatments, chronic morbidity, and associated mortality. Their prevalence and distribution continue to vary from one geographical region to another, with high prevalence detected among high-risk populations, especially among HIV-infected individuals [12].

The present study, which was conducted in the Republic of Congo, specifically in a hospital in Brazzaville, involved a population attending the laboratory department. The objective was to determine the prevalence of HIV/HBV co-infection in an urban population living in Brazzaville who had come for consultation. Several studies in Africa have revealed the harmful association of HIV and HBV in immunocompromised individuels [13-15].

We worked on 130 samples taken from patients who visited the laboratory department of Djiri General Hospital in Brazzaville. Blood samples were taken from the elbow crease into EDTA tubes and then decanted into Eppendorf tubes for storage at -20°C. The analyses were performed using Determine® rapid tests. The ELISA technique enabled us to confirm positive cases. Our study was conducted over a period of one month and 12 days, from June 15 to July 27.

Our study population consisted of women and men, young people and adults who came to the laboratory for biological tests. The average age was 32±19 years. Other studies have reported average ages similar to or different from ours. This is the case in studies conducted in Benin by Dovonou et al., in Guinea by Makanera et al., in Mali by Konate et al., and in the Central African Republic by Packo et al., where the average ages were 36±1.10 years, 38.37±10.45; 37.9±10.9 years and 25±1 years [13,14,16,17]. These differences can be explained by the size of our sample compared to those of the studies cited and by the type of population analyzed. Our average age was lower than that obtained by Niama in a population of HIV-infected individuals in the Republic of Congo (41±13 years) [18]. As in previous studies, the difference is due to the size of their sample. We also observed a difference between the average age obtained in a study in Mauritania by Pivert et al. and ours of 37 years [19].

With regard to gender, women predominated in our study population (64.6%). Niama in Congo and Hamza in Mali obtained the same results in their studies [15,18]. However, other studies in Africa reported a predominance of men, as was the case in studies conducted in Conakry (72.9%), Niamey (54.94%), and Bamako (52.2%) [16,17].

According to occupational category, workers were the most represented group, with a rate of 40.77%. We obtained the same results as those of studies conducted by Makanera on a sample size of 291 patients (72.9%). However, in the study by Hamadine et al., the household category was the most represented (36.26%). This difference can be explained by the fact that in West Africa, people often engage in commercial activities rather than being civil servants or workers in a state institution, and the study population consisted of people living in rural and urban areas. There was a predominance of single people in our study population (73.08%) in terms of the marital status of participants.

Biological analyses, after confirmation of the results by ELISA, reported prevalences of 4.62% and 8.46% for HBV and HIV, respectively, with a co-infection prevalence rate of 9.09%. Our prevalence of co-infection was close to that obtained by Packo in a study of blood donors in Bangui, where the prevalence was 6.47% [13]. However, other studies have reported lower or higher prevalences than ours. This is the case for studies conducted in Benin by Dovonou (16.9%), in Gambia by Bittaye (3.6%), in Burkina Faso by Ouedraogo (2.14%), by Bossali (1%), and by Angounda (6.9%) in the Republic of Congo [8,14,20,21,22]. A study by Kafeero et al. on meta-analysis in sub-Saharan Africa also reported a co-infection prevalence of 3.3% [23]. These observed differences can be explained by the fact that the selection criteria in these studies were different from ours. In Benin, for example, the study focused exclusively on PLHIV, while in Gambia, it focused on subjects with hepatocellular carcinoma. The sample sizes of these studies may explain the differences observed between our results and theirs.

Although there was an even distribution of HBV carriage across age groups, with a predominance among women, in terms of gender; although the 12-35 age group was more infected with HIV in our study, we did not find a significant association between the two infections and socio-demographic variables (gender, occupation, age, marital status). Some studies also found no association with these variables. That said, the results of our study are identical to those obtained by Kabinda et al. in the Democratic Republic of Congo, by Omatola in Nigeria in a population of apparently healthy pregnant women, and by Angounda et al. in the Republic of Congo [24,25]. This is also the case in the study conducted by Dovonou in Benin [14]. However, the Kafeero study in sub-Saharan Africa, in a meta-analysis, found that these variables were significantly associated with HBV and HIV carriage in its study population [22].

This difference may be due to the size and type of population in his study, as they worked in several countries with a larger population than the other.

Conclusion

Our study, which focused on a population of men and women attending the laboratory department of Djiri General Hospital in Brazzaville, aimed to determine the prevalence of HBV/HIV coinfection. Our results showed low prevalence rates for both infections, with a distribution that should be taken seriously in the 12-35 age group, i.e., young people. Although we did not find a significant association between the two infections and variables such as age, gender, marital status, and occupation, we can say that the results obtained can help health system actors to intensify outreach and information programs on HBV and HIV infections, especially since their coinfection has harmful consequences within the population and young people remain the most infected according to the results obtained. It would also be important to intensify actions targeting young girls, as women remain the most vulnerable gender to contracting either HIV or HBV, according to the results obtained in this study.

Ethical Considerations

This study was conducted in accordance with ethical guidelines for research involving human subjects in the Congo. Administrative agreements were obtained from the management of Djiri General Hospital to collect samples from patients attending the laboratory department. Patients were informed of the purpose and process of this study, in accordance with the Declaration of Helsinki. Confidentiality and anonymity of the information provided were guaranteed. All participants gave their consent by signing a form.

Artificial Intelligence

The authors declare that no generative AI technology such as large language models (ChatGPT, COPILOT, etc.) and text-to-image generators were used in the writing of this manuscript.

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Conflicts of Interest

The authors declared that they had no known financial or non-financial conflicts of interest or personal relationships that could have influenced the work presented in this article.

Availability of Data and Materials

All data underlying the results described in this article have been presented in full in the manuscript.

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