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Clinical and Paraclinical Profiling of Patients with Viral Hepatitis B and C Attending Saint Camille Hospital in Ouagadougou (HOSCO)

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Abstract

The present study aims to describe the clinical and paraclinical profile of patients infected by viral hepatitis B and C and follow-up. The clinical and paraclinical data used in this description are from patients infected by viral hepatitis B and C of the HOSCO Hepato-Gastroenterological Department from May 15, 2021 to July 23, 2021. The informed consent was provided to each patient included in this study. "Univariate analyses were evaluated using Pearson's Chi2 test" using R software version 4.0.2. During the study period, we identified 149 patients with viral hepatitis B and/or C who met our inclusion criteria. The sex ratio was 0.83 at the rate of 68 men for 81 women with the average age at 37.17 years ± 12.21 years. The most represented age group was 30 - 44 years (49.7%). The most incriminated risk factors were medical care by injection (62.58%), excision (31.90%), blood transfusion (4.29%) and scarification (1.23%). HBV infection was the majority with a frequency of 95.97%. The HBV viral load was measured in 91.95% of patients, 77.18% of whom had a detectable DNA viral load ≤ 2000 IU/mL. The clinical and biological course was good in patients after therapeutic initiation. HBV-HCV-HIV co-infection was 0.67%. Abdominal ultrasound was normal in 87.92% of patients. Fibrosis was minimal and moderate in 58.39% and 19.46% of patients. Among patients, 52.35% were on Tenofovir therapy, 2.68% on Sofosbuvir/Velpatasvir, 0.67% on ARVs and 44.29% did not require treatment. Viral hepatitis B and C are common, and both affect sex. Thus, new screening strategies need to be

implemented to improve the diagnosis of hepatitis B and C. Effective strategies against viral hepatitis B and C must be developed, subsequently.

Keywords

Hepatitis B and C, Co-Infection, Primary Liver Cancer (PLC), Cirrhosis, HOSCO

1. Introduction

Viral hepatitis is an inflammatory disease of the liver, characterized by damage to the parenchyma hepatic cells that may be of infectious (viral), toxic, metabolic or immunological (allergic, autoimmune) origin [1]. It evolves in an acute and chronic form with a great diversity of clinical manifestations [2]. There are at least six viruses responsible for viral hepatitis, among them, viral Hepatitis B (HBV) and C (HCV) are endemic in Sub-Saharan Africa, with estimated prevalence rates respectively from 8% to 20%, and from 2% and 2.8% [3]. Acute infection can heal or become chronic. The chronic forms can evolve insidiously for years (more than twenty years) and be complicated by cirrhosis and Primary Liver Cancer (PLC), the most important cancer in humans in Africa. These complications lead to the premature death of 15% to 25% of patients, making hepatitis the second leading cause of death in the world and certainly the leading cause of death in many Sub-Saharan countries [4]. More than 80% of PLC cases worldwide are caused by a viral infection: Hepatitis B Virus (HBV) in two-thirds of cases, and Hepatitis C Virus (HCV) in the remaining third [3].

Viral hepatitis C (50% to 60% of cases) is more common in the form of chronic active infection that can progress in 20% of cases to cirrhosis [5]. It is usually transmitted by direct contact with infected blood [6]. Worldwide, the WHO estimates that 170 million people, or 3% of population, are infected by HCV and are at risk of developing cirrhosis and liver cancer [6]. In Europe, the number of people infected by HCV is estimated at 9 million, or 1.03% of the European population [6]. In Africa, 32 million people carry the virus, or 5.3% of the African population [6].

As for hepatitis B, it is a disease whose impact on the population remains a major public health concern in the world, particularly in Sub-Saharan Africa where there are regions of high endemicity [7] [8]. Despite the existence of an effective vaccine available for two decades, this disease is still one of the most spread out worldwide [9]. Sex workers, homosexuals, drug addicts, multiple transfusion recipients, and medical and paramedical personnel constitute the groups at risk [10]. Chronic carriage of HBV often progresses to cirrhosis, or primary liver cancer [11]. Hepatitis B virus is the cause of 80% of liver cancer, particularly in Asia and in Africa [12] [13].

The World Health Organization (WHO) estimates the number of people infected with the hepatitis B virus at two billion and the number of chronic carri-

ers at 400 million, of which 60 million are in Africa [3]. The hepatitis B virus is the 9th leading cause of death worldwide, with one million deaths each year from fulminant hepatitis, cirrhosis or liver cancer [14].

In Burkina Faso, in 2018, the cross-referencing of serological results with demographic data from the Demographic Health Survey (DHS) revealed a national prevalence of 9.1% for HBV and 3.6% for hepatitis C. The analysis also shows that this high prevalence of HBV is uniformly high in the country. However, the prevalence of HCV varies according to the sex, the age of the individuals, their level of education and income, the ethnic group, the serological status of their partner, the rural or urban sector, and especially their living area in Burkina Faso [15]. The significant areal disparities in prevalence observed for the first time, is one of the most important contributions of the present study. Thus, the southwestern part of Burkina Faso has a very high prevalence of HCV infection (13.2%), especially among young people aged 15 to 20 (12.9%). That is a sign of an outbreak of infectious.

Burkina Faso is classified as high endemic for hepatitis B and low-intermediate for hepatitis C [15]. Considering the endemic context of viral hepatitis in Burkina Faso, *i.e.* the high prevalence of HBV and HCV and the complications of these pathologies, the present study is mandatory. In fact, with the description of the clinical and paraclinical profile of patients infected by viral hepatitis B and C and follow-up in the Gastroenterology Department at Saint Camille Hospital in Ouagadougou (HOSCO), identification and implementation of suitable management strategies can be elaborated accordingly.

2. Methodology

2.1. Setting and Scope of the Study

The study was realized in the Gastroenterology Department of Saint Camille Hospital in Ouagadougou (HOSCO) in Burkina Faso. HOSCO "ex. Saint Camille Medical Center" is a religious health care center rule by the religious of Saint Camille and administratively located in the Regional Health Direction of the Centre. Located in sector 23 of the city of Ouagadougou on Avenue Babangida, HOSCO has qualified, competent staff, for taking care patients.

2.2. Type and Period of Study

This was a descriptive cross-sectional study with prospective data collection, from May 15, 2021 to July 23, 2021.

2.3. Study Population

2.3.1. Sampling, Sample

We proceeded to an exhaustive sampling of all patients screened positive for viral hepatitis B and C in the Gastroenterology Department during this period. We systematically recruited all the patients concerned by the study, coming in consultation, having a clinical file of follow-up in the service.

2.3.2. Data Collection Technique and Study Procedure

The data for the study were collected on an individual collection sheet during consultations in the Hepato-Gastroenterology Department from May 15 to July 23, 2021 at HOSCO. The entire cohort of patients for the study was recruited during their consultations during this period. The clinical and paraclinical data of the patients were collected on the basis of their clinical examination and the data available in their follow-up medical file in the Hepato-Gastroenterology Department. Paraclinical examinations were also requested during the consultation. The patients carried out the paraclinical examinations and returned the results to us, which we have taken into account.

2.4. Study Variables

We collected the following dependent variables from the patients: sociodemographic, clinical, paraclinical and therapeutic. Only the results of HBV and HCV serological and virological tests were independent variables and were collected in the patients' follow-up clinical records.

2.5. Data Analysis

The data collected was coded. Data entry and analysis were done on a microcomputer equipped with Microsoft Word 2019, Excel 2016 and R software version 4.0.2. The data obtained was analyzed and commented on. Results with p-value < 0.05 were considered statistically significant.

2.6. Ethical Considerations

For the realization of our study, we obtained the authorization of the Director General of HOSCO as well as that of the head of the Gastroenterology Department of HOSCO. The study was approved by the institutional ethics committee of HOSCO by its deliberation No. 2021-06-010 of June 28, 2021. The anonymity and confidentiality of the information collected in the files were respected.

3. Results

3.1. Sociodemographic Characteristics of the Population

We integrated a total of 149 patients over two months from May 15 to July 23, 2021. The 149 patients included 68 men and 81 women, the average age of the patients was 37.17 ≠ 12.21 (extreme 7 and 75) with a sex ratio of 0.83. Among the patients, 115 (77.2%) were of urban origin, and 34 (22.8%) of rural origin. The 149 patients included 33 (22.15%) housewives, 28 (18.79%) pupils/students and 25 (16.78%) civil servants. The sociodemographic characteristics of the study population according to marital status indicate that of the 149 patients, 102 (68.46%) were married, 35 (23.49%) were single. On the level of education, among the 149 patients, 51 (34.23%) were of higher level and 41 (27.52%) patients of secondary level. The distribution of patients according to risk behavior specifies that of the 149 patients, 62.58% had already received medical care by injection,

31.90% had been circumcised, 4.29% of patients had already been transfused and 1.23% were carriers of ethnic scarification ($p < 0.001$).

3.2. Frequency of Viral Hepatitis B and C

3.2.1. Frequency of HBV and HCV Viral Markers According to Age

The frequency of HBV and HCV markers according to age shows that of the 149 patients, 74 (49.7%) were between 30 and 44 years old. Of these 74 patients, 95.95% were HbsAg positive with 4.05% HbeAg positive and 89.19% HbeAb positive (Table 1). In our study, 93.02% (40/43) of patients under 30 had positive Hbs Ag and 93.40% (99/106) of patients aged 30 or over had positive Hbs Ag. It should also be noted that 81.81% of patients over 30 had positive anti-Hbe Ac and 88.57% of patients under 30 had positive anti-Hbe Ac.

3.2.2. Frequency of Viral Hepatitis B and C According to Sex and Place of Residence

The frequency of viral hepatitis B and C according to sex and according to place of residence is presented in Table 2. Of the 149 patients, the women objected to a frequency for HBV of 53.02% and for HCV of 1.34%. There was no co-infection. Men accounted for 42.95% of HBV cases, 2.01% of HCV cases and 0.67% of HBV/HCV co-infection cases. The frequency of HBV and HCV according to place of residence indicates that the urban area dominated over the rural area with a frequency of HBV of 73.82% and of HCV of 2.69% with a co-infection of 0.67%.

3.3. Biological Characteristics

Virological characteristics of HBsAg-positive patients were determined. Indeed, out of the 149 patients, 115 (77.18%) patients had an HBV DNA viral load value

Table 1. Prevalence of HBV and HCV markers according to age.

Age Group (Years)	HBV						HCV
	Effective	HbsAg	Anti-Hbs Ab	AgHbe	Anti-Hbe Ab	Anti_HbcAb	Anti-HCV Ab
<15	1 0.7%	100% (1/1)	0% (0/1)	0% (0/1)	100% (1/1)	0% (0/1)	0% (0/1)
15 - 29	42 28.2%	92.86% (39/42)	0% (0/42)	4.76% (2/42)	83.33% (35/42)	2.38% (1/42)	4.76% (2/42)
30 - 44	74 49.7%	95.95% (71/74)	0% (0/74)	4.05% (3/74)	89.19% (66/74)	0% (0/74)	0% (0/74)
45 - 59	21 14.1%	85.71% (18/21)	0% (0/21)	9.52% (2/21)	80.95% (17/21)	4.76% (1/21)	9.52% (2/21)
>59	11 7.4%	90.91% (10/11)	0% (0/11)	0% (0/11)	90.91% (10/11)	0% (0/11)	9.09% (1/11)
Total	149 100%	93.29% (139/149)	0% (0/149)	4.70% (7/149)	86.58% (129/149)	2.01% (3/149)	3.36% (5/149)

Table 2. Frequency of HBV and HCV according to sex and place of residence.

	Total	Male	Female	
Infection	**149**	**68**	**81**	**p-value**
HBV	95.97% (143/149)	42.95% (64/149)	53.02% (79/149)	0.860
HCV	3.36% (5/149)	2.02% (3/149)	1.34% (2/149)	0.526
HBV/HCV	0.67% (1/149)	1.67% (1/149)	0% (0/149)	0.554
	Total	**Urban Areas**	**Rural Areas**	
Infection	**149**	**115**	**34**	**p-value**
HBV	95.97% (143/149)	73.82% (110/149)	22.15% (33/149)	0.916
HCV	3.36% (5/149)	2.69% (4/149)	0.67% (1/149)	0.882
HBV/HCV	0.67% (1/149)	0.67% (1/149)	0% (0/149)	0.863

Table 3. HBV viral load in HBsAg-positive patients.

Characteristics (N = 149)	Viral Load
HBV DNA (IU/mL) (mean ± SD)	204,562,818.78 ± 2,266,890,347.71
HBV DNA ≤ 2000 IU/mL, n (%)	115 (77.18%)
2001 ≤ HBV DNA < 20,000 IU/mL, n (%)	6 (4.03%)
HBV DNA ≥ 20,000 IU/mL, n (%)	15 (10.07%)
Undetectable, n (%)	1 (0.67%)
Not Done, n (%)	12 (8.05%)

of less than 2000 IU/mL. Table 3 shows the HBV viral load results in HBsAg-positive patients.

The virological characteristics of the patients according to the profession were studied and the results show that of the 149 patients the housewives dominated with a prevalence of 21.48% for the positive HBsAg, 19.46% for the positive AcHBe (Table 4).

Table 5 represents the distribution of patients according to sociodemographic characteristics and HBV DNA viral load value. This study shows that of the 149 patients, the HBV DNA viral load values were as follows: 65 women and 50 men with a value ≤ 2000 IU/mL; 106 patients aged ≥ 30 years and 43 patients aged ≤ 30 years with a value ≤ 2000 IU/mL; 91 patients from urban areas and 24 from rural areas with a value ≤ 2000 IU/mL; 28 housewives, 24 civil servants and 18 pupils/students with a value ≤ 2000 IU/mL; 79 married and 25 single with a value ≤ 2000 IU/mL. In our study, the majority of patients (77.18%) had a HBV

Table 4. Virological characteristics of patients according to profession.

Occupation	HBV			HCV Anti-HCVAb
	HBsAg+	HBeAg+	Anti-HBe + Ab	
Health Worker	2.68% (4/149)	0% (0/149)	2.68% (4/149)	0% (0/149)
Farmer	4.7% (7/149)	0% (0/149)	4.7% (7/149)	0% (0/149)
Trade	10.74% (16/149)	0% (0/149)	10.07% (15/149)	0% (0/149)
Employee	7.38% (11/149)	0,67% (1/149)	6.04% (9/149)	0% (0/149)
Teacher	0% (0/149)	0% (0/149)	0.67% (1/149)	0% (0/149)
Pupil/Student	17.45% (26/149)	1.34% (2/149)	15.44% (23/149)	1.3% (2/149)
Civil Servants	15.44% (23/149)	1.34% (2/149)	13.42% (20/149)	0% (0/149)
Outfit Man	6.71% (10/149)	0% (0/149)	7.38% (11/149)	0% (0/149)
Houseold	21.48% (32/149)	0% (0/149)	19.46% (29/149)	0.7% (1/149)
Retirees	3.36% (5/149)	0% (0/149)	3.36% (5/149)	0.7% (1/149)
Other	3.36% (5/149)	0% (0/149)	3.36% (5/149)	0.7% (1/149)
Total	93.29% (139/149)	0% (0/149)	86.58% (129/149)	3.4% (5/149)

Table 5. Distribution of patients according to sociodemographic characteristics and HBV DNA viral load value.

		Patient Frequencies by HBV DNA Value (IU/mL)					
Variables	Modality	≤2000	2000 - 20,000	≥20,000	Undetectable	No Done	Total
Sex	Female	65 (43.62%)	2 (1.34%)	7 (4.7%)	1 (0.67%)	6 (4.03%)	81 (54.36%)
	Male	50 (33.56%)	4 (2.68%)	8 (5.37%)	0 (0%)	6 (4.03%)	68 (45.64%)
Age Range (Years)	<30	31 (20.8%)	2 (1.34%)	6 (4.03%)	0 (0%)	4 (2.68%)	43 (28.86%)
	≥30	85 (57.05%)	4 (2.68%)	9 (6.04%)	1 (0.67%)	8 (5.37%)	106 (71.14%)
Origin	Urban Areas	91 (61.07%)	4 (2.68%)	12 (8.05%)	1 (0.67%)	7 (4.7%)	115 (77.18%)
	Rural Areas	24 (16.11%)	2(1.34%)	3 (2.01%)	0 (0%)	5(3.36%)	34 (2.82%)
Occupation	Health Worker	3 (2.01%)	0 (0%)	1 (0.67%)	0 (0%)	0 (0%)	4 (2.68%)
	Farmer	4 (2.68%)	0 (0%)	1 (0.67%)	0 (0%)	3 (2.01%)	8 (5.37%)
	Trade	14 (9.4%)	0 (0%)	2 (1.34%)	0 (0%)	0 (0%)	16 (10.74%)
	Employee	9 (6.04%)	0 (0%)	1 (0.67%)	0 (0%)	1(0.67%)	11 (7.38%)
	Teacher	2 (1.34%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (1.34%)
	Pupil/Student	18 (12.08%)	2 (1.34%)	5 (3.36%)	1 (0.67%)	2(1.34%)	28 (18.79%)
	Civil Servant	24 (16.11%)	0 (0%)	1 (0.67%)	0 (0%)	0 (0%)	25 (16.78%)
	Outfit Man (Military)	6 (4.03%)	3(2.01%)	2 (1.34%)	0 (0%)	0 (0%)	11 (7.38%)
	Household	28 (18.79%)	0 (0%)	1 (0.67%)	0 (0%)	0 (0%)	29 (19.46%)
	Retirement	4 (2.68%)	0 (0%)	1 (0.67%)	0 (0%)	2 (1.34%)	7 (4.7%)
	Other	5 (3.36%)	1 (0.67%)	0 (0%)	0 (0%)	2 (1.34%)	8 (5.37%)

Continued

Marital Status	Unmarried	25 (16.78%)	3 (2.01%)	4 (2.68%)	0 (0%)	3 (2.01%)	35 (23.49%)
	Married	79 (53.02%)	3 (2.01%)	10 (6.71%)	1 (0.67%)	9 (6.04%)	102 (68.46%)
	Cohabiting	9 (6.04%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	9 (6.04%)
	Widoved	2 (1.34%)	0 (0%)	1 (0.67%)	0 (0%)	0 (0%)	3(2.01%)

Table 6. Biochemical parameters of patients in the study population.

	Number of Cases				
	<N	N	N < X ≤ 2N	2N < X ≤ 3N	>3N
ALT	0	131	11	2	2
AST	0	129	13	2	2
TB	0	10	3	0	0
CB	0	2	2	1	2
ALP	0	6	4	0	0
GGT	0	10	3	0	3
AFP	0	38	6	1	3
ALB	2	1	0	0	4

N: Normal Value; ALT: Alanine Aminotransferase; AST: Aspartate Aminotransferase; TB: Total Bilirubin; CB: Conjugated Bilirubin; ALP: Alkaline Phosphatase; GGT: Gamma Glutamyl Transferase; AFP: Alpha Fetoprotein; ALB: Albumin.

viral load of less than or equal to 2000 IU/mL.

The biochemical characteristics of the 149 patients studied are shown in Table 6. The majority of patients had normal serum transaminase values. The normal results of the biochemical analyzes are 131 patients for ALT; 129 for ASTs; 10 for the TBs; 2 for CBs; 10 for normal GGT; 38 for normal AFP; 1 for normal albumin.

3.4. Morphological Characteristics

3.4.1. Ultrasound Signs of Viral Hepatitis B and/or C

The distribution of patients according to the results of the abdominal ultrasound shows that from the 149 patients, 131 patients presented a normal ultrasound with a prevalence of 87.92%, 2.68% showed hepatomegaly, 3.36% of the signs portal hypertension (pH), 5.37% steatosis and 0.67% signs of pH and steatosis ($p < 0.001$).

3.4.2. Fibroscan Signs

The classification of the patients according to the fibroscan specified that from the 149 patients, 87 presented minimal fibrosis, 29 moderate fibrosis, 14 severe fibrosis and 6 patients' cirrhosis ($p < 0.001$). It should be noted that 13 patients did not perform their liver fibroscan.

3.5. Therapeutic Profile of Patients

The distribution of patients according to their treatment was determined and

from the 149 patients, 52.35% were on Tenofovir, 2.68% on Sofosbuvir and Velpatasvir, 0.67 on Antiretrovirals (ARVs) and 44.29% of patients had no treatment. Table 7 represents the distribution of patients according to their treatment.

3.6. Patient Follow-Up

The distribution of patients according to their follow-up indicated the following results. From the 149 patients 92.61% were regularly followed and 7.38% of the patients were irregularly followed. We found a p-value < 0.001.

4. Discussion

The mean age of the patients was 37.7 ± 12.21 years with extremes of 7 and 75 years. The most represented age groups were that of 30 - 44 years with a frequency of 49.7%. These results corroborate those found in West Africa. Indeed, Mbianda Nsami [16] in Madagascar, Kpossou *et al.* in Benin [17] and Diallo *et al.* [18] in Senegal found a mean age of 41.51 ± 13.22, 39.7 ± 12.57 and 33 ± 11.28 respectively. These results explain the fact that viral hepatitis B and C affect the active part of the population with a significant negative socio-economic impact. However, as the modes of transmission of viral hepatitis B and/or C are multiple, all age groups can be infected by these viruses and this is confirmed in our study. Our study shows a female predominance with 81 women or 54.4% of the study population and a sex ratio of 0.84. Other studies also report a female predominance, in particular Chkouri [19] in Sénégal and Simondon *et al.* [20] in France, with frequencies of 54.8% and 51.61% respectively. These results could be explained by the fact that the major part of the patients studied were females given their predominance, *i.e.* 51.7% of Burkina Faso people [21]. In addition, Burkina Faso highlights the PMTCT for screening the pregnant women. Furthermore, many other factors increase the vulnerability of women to STIs respect to men who are protected by circumcision.

Indeed, anatomical and physiological factors suggest that the vagina, with its large surface area and fragility, facilitates the penetration of viruses, and the incidence of STIs; socio-cultural factors suggest that sexual activity tends begin earlier for among women and generally with older partners. Sex remains a taboo in our societies, especially for women, so the issues involved are not always fully discussed. Moreover, some traditional practices such as forced marriage, levirate marriage and excision, increase this vulnerability to HIV infection; economic

Table 7. Therapeutic profile of patients in the study population.

Type	Under Treatment	Number (%)	p-value
HBV	Tenofovir	78 (52.35)	<0.001
	None	66 (44.29)	
HCV	Sofosbuvir/Velpatasvir	4 (2.68)	
HBV/HCV/HIV	ARV	1 (0.67)	

factors suggest that the precarious state in which some women live forces them to have unprotected sexual relations in exchange for goods in kind or in cash. On the other hand, our results are different from those of Seribara [22] in Mali and Mbianda Nsami [16] in Madagascar which objectified a male predominance of 76.8% and 66.66%.

The major part of the studied population (77.2%) resided in urban areas and only 22.8% resided in rural areas. These results are aligned with the ones found by Ouédraogo [23] in Burkina Faso and by Hamzaoui [24] in Madagacar 77.3% and 58.83%, respectively. These results can also indicate the "ease access" of people living in urban areas to health centers. Married people represented 68.46% of our study population. These results are similar to those of other authors in Africa, notably Bane [25] in Mali with a frequency of marriages of 71%. On the other hand, our results are not aligned with the ones from some authors who report a predominance of single people like Dembélé [8] in Mali with a prevalence of 95.68%. These results could be explained by the fact that Dembélé's studied population was younger.

The correlation of the two most important levels of education to the disease prevalence lead to 34.23% and 27.52% of prevalence respectively to the highest level and the next one. Our results corroborate those of Bane in Mali [25] who noted 29% for the highest level and 33% for the secondary one. These results may explain the fact that the patients with the highest level and relatively higher economical income are oriented towards modern medicine rather than towards traditional therapists. Housewives (22.15%) and pupils/students (18.79%) were the most represented professions. These results are different from those of Seribara [22] in Mali which found more farmers (29%) and those of Fiogbe *et al.* [26] in Benin with more civil servants (53.2%). These results can be explained by the fact that the majority of the population in Burkina Faso is illiterate, especially women, and by the country's level of development [27].

Regarding the risk factors, in the present study, 62.58% received already medical care by injection, the majority of women, *i.e.* 31.9% of the population, were circumcised and 4.29% received already blood transfusion. The data from this study corroborate those of Keta *et al.* [28] in 2017 who noted 64.2% of medical care by injection and 22% of blood transfusion.

In Mali, Bane [25] found an association between of tattooing and blood transfusion of 21.05%. As for Laquari [29] in Morocco, he noted medical care in 5.6%, piercings in 19.1% and blood transfusion in 3.2% of cases. As for Mbianda Nsami [16] in Madagascar, she found medical care by injection in 22%, a blood transfusion in 9.4% and tattooing in 5.12% of cases. These results explain the multiple modes of transmission of viral hepatitis.

Regarding the prevalence of viral hepatitis B and C, the prevalence of viral markers HBV and HCV according to age gives rise to this interpretation. In our study, 49.7% of HBsAg-positive and HBeAb-positive patients were from 30 to 44 years of age. HCV antibody was predominant in the 45 - 59 age group (14.1%). Zéba in his study in Burkina Faso [30] reported that the majority of

HBsAg-positive patients were over 30 years of age (59.7%). From these patients, 31.9% were HBsAg positive. Anti-HCV antibodies were predominant in the 20 - 29 age group (34%), with a prevalence of 5.1%.

The prevalence of viral hepatitis according to sex in our study population showed that there are more women carriers of HBV with a frequency of 53.02% (79/149) against 42.95% (64/149) in men. Our results corroborate those of Kabinda in Congo [31] with a prevalence of 67.46% (141/209) in women and 32.54% (68/209) in men. On the other hand, different results are found by other authors, notably Zéba [30] in Burkina Faso and Seribara [22] in Mali who noted a male predominance with respective prevalences of 52.38% and 76.8%. These results could be explained by the majority participation of women in our study, their much greater availability, the dominant character of the female sex in Burkina Faso [6] with a rate of 51.7%. The modes of transmission of viral hepatitis B and/or C being multiple, all age groups can be infected by these viruses and this is confirmed in our study.

Biological characteristics in the present study also revealed that 131 patients had a normal ALT value, 129 patients had a normal AST value, 10 patients had a normal BT value, 2 patients had a normal BC value, 10 patients had a normal GGT value, 38 patients had a normal AFP value and one person had a normal albumin value. Our results are different from those of Mbianda Nsami [16] who noted in Madagascar cholestasis in 33.3% of cases, cytolysis in 62.4% and hepatocellular insufficiency in 41.9% of cases. The transaminases were normal in 24.8% of the cases and the AFP unknown in 82.1% of the cases, but elevated in 12.8% of the cases and those of Seribara [22] in Mali which noted an elevation of ALT in 9 6% of cases, AST in 15.1% of cases and AFP also in 8.3% of cases. It should be noted that the biological data were unknown in the majority of cases.

According to the morphology, the ultrasound signs of viral hepatitis B and/or C made it possible to decide on hepatomegaly and splenomegaly. Indeed, hepatomegaly and splenomegaly are possible during acute and chronic viral hepatitis [32]. Ultrasound also has its place in eliminating [33]: dilatations of the intra- and extra-hepatic bile ducts which are not in favor of acute and chronic viral hepatitis; acute pancreatitis and acute cholecystitis.

In this study, ultrasound was normal in 87.92% of cases, 2.28% hepatomegaly, 3.36% signs of portal hypertension (pH), 5.37% hepatic steatosis and 0.67% had both steatosis and pH. Our results are different from those of Ouédraogo [23] who noted hepatomegaly in 27.3% of cases in Burkina Faso and of Ouavene *et al.* [34] in Central Africa who noted hepatomegaly in 30.5% of cases and 2 % of patients had normal ultrasound. Mbianda Nsami [16] found in Madagascar normal ultrasound in 27.77% of cases, hepatomegaly in 32.22% of cases, pH in 20% of cases and steatosis in 12.22% of cases.

From the Fibroscan, the major part of patient's cohort display minimal fibrosis, *i.e.* 58.39%, 19.46% moderate fibrosis, 9.40% severe fibrosis and 4.03% cirrhosis. Fibroscan was not performed in 8.72% of patients.

These results are different from those of Ouafi [35] in his study in Morocco with 87% of patients presenting with moderate and severe fibrosis (F2, F3, F4) including 27% at the cirrhosis stage. As for Shen *et al.* [36] in China, he noted moderate fibrosis in 12.9% of cases, severe fibrosis in 64.52% of cases and cirrhosis in 22.58% of cases.

The therapeutic profile of the patients concerning the 149 patient's cohort indicated that 52.35% were under tenofovir treatment, 2.68% under sofosbuvir/velpatasvir treatment and 0.67% under ARV treatment. A percentage of 44.29% of patients did not need treatment. Diallo *et al.* [18] in his study in Dakar found 7.97% of patients on tenofovir disoproxil fumarate treatment. On the other hand, Ouédraogo [23] found in Burkina Faso a frequency of 38.9% of patients on tenofovir disoproxil fumarate.

Patient follow-up is done by biology, ultrasound, fibroscan and endoscopy. The persistence of transaminases as well as HBs Ag and HBV and HCV viral load > 6 months characterizes an evolution of hepatitis towards chronicity. The monitoring of our patients should be rigorous. But this is difficult or almost impossible given the financial problems. The elements to be monitored are signs of hepatocellular insufficiency, portal hypertension and hepatocarcinoma, which are all complications. Follow-up was regular in 92.61% of patients in our series.

HBV carriage can be active or inactive. Of course, good medical follow-up involving clinical, epidemiological, paraclinical, therapeutic and evolutionary aspects increases the probability of a favorable prognosis. Furthermore, Diallo *et al.* reported that HBsAg-positive patients undergoing tenofovir-based antiviral treatment had a virological and biochemical response of 85% and 100% respectively after 120 weeks of treatment [18]. But the emphasis must be on prevention at every level.

According to the WHO, one of the indicators for monitoring the health sector response to viral hepatitis B and C is the suppression of the HBV viral load in people with chronic hepatitis B who have been treated, and the cure of patients with chronic hepatitis C who have been treated [3]. In our study, the majority of patients (77.18%) had a HBV viral load of less than or equal to 2000 IU/mL. According to Causse *et al.*, the definition of inactive Hepatitis B Virus (HBV) carrier is based on repeated measurements of transaminases and HBV viral load for at least 1 year [37]. ALT transaminases should be strictly normal and B viral load < 20,000 IU/mL. This status corresponds to immunological control of the infection by the infected patient and is associated with a good prognosis, with a very low risk of progression to cirrhosis and cancer [37].

Thus, the fight against viral hepatitis B and C should be done by promoting the use of condoms and all control measures to fight against STIs; by preventing parenteral contamination among drug users by raising awareness of the risks of sharing injection equipment and by strictly respecting the rules of hygiene and sterilization of care equipment used during invasive medical procedures, makes it possible to fight against nosocomial transmission. The promotion of national

days for the fight against hepatitis B and C should be done as it is for AIDS.

On screening, actions such as promoting screening for HBV and HCV within the population, automatically screening all blood donors; systematically screening for HBsAg and anti-HCV Ab in pregnant women for better care of the newborn at birth; introducing screening for hepatitis B and hepatitis C in the list of pre-employment examinations as well as in the list of prenuptial examinations; providing biological analysis laboratories with adequate and reliable equipment for the rapid detection of viral markers as well as anatomopathological laboratories with adequate equipment for liver biopsy promoting the evaluation of the chronic evolution of liver diseases due to B viruses and it will be beneficial. One of the limits of this study is the missing of some medical surveillance parameters, such as the length of medical follow-up and details of case management.

5. Conclusion

The present study elucidated and described the clinical and paraclinical profile of HBV and HCV infection during medical follow-up in the Hepato-Gastroenterology Department of Saint Camille Hospital in Ouagadougou. It appears from our study that the patients were mostly young women. The most represented risk factors are from medical care by injection, excision, blood transfusion and ethnic scarification. The prevalence of HBV and HCV infection remains a major concern. Clinical and paraclinical outcomes were normal in patients undergoing treatment. The results of this work pave the way for being aware of early diagnosis in order to prevent contamination and improve the evolution under treatment. It can be helpful also in the development of effective strategies for the fighting against hepatitis. Prevention remains the most effective method to successfully control HBV and HCV infection and vaccination remains the best means of prevention against HBV.

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Authors' Contributions

Study concept and design: TMZ, DPI and LD. Sample collection: LD. Statistical analysis and interpretation of data: TMZ, DPI and LD. Drafting of manuscript: TMZ, DPI and LD. Critical revision of the manuscript for important intellectual content: TMZ, DPI, TRCID, LZ and JS. Study supervision: TMZ, DPI and JS.

Conflicts of Interest

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

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